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A few simple rules to conserve carbide tools

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OUCH!
FIRST AID
Watch your carbide tools! Don't let them
they break! Change them for resharpening
reasonable number of pieces have been ma
This will give you more pieces per tool. Rem
sharp tools give better accuracy and use less
HANDLE 'EM WITH CARE!
IT'S BEST TO BABY 'EM!
Carbide tool cutting edges should be protected so that they do not come in contact with other tools or metal parts except when cutting. It is best to provide wooden, partitioned boxes for storage. Use plastic dip or tape on the tips.
FIRTH-STERLING STEEL COMPANY
'EM CORRECTLY
-CE -ETTIN'! THANK YOU, SIR!
Carbide tools should have just enough provide free cutting action, AND NO
Otherwise you weaken the cutting edg
cutting point exactly at the height
ork.
COMPA
WHEN GRINDING DONT USE TOO MUCH FORCE
HELP!
Don't exert too much pressure against the abrasive wheel when grinding carbide tools. If the wheel is right, light pressure will remove metal
suitable rate. Too much pressure
heating and may d
FIRTH-STE
BE SURE TO USE THE PROPER TOOL!
FOR SIZE
FOR SHAPE
FOR STYLE
FOR TIP
Carbide tools operate at higher speeds th
other metal-cutting tools. Carbide tools
always be larger than the steel or alloy
they replace. Also, make sure they are
correct style, shape, and grade.
FIRTH-STERLING STEEL COMPANY
GRIND 'EM PROPERLY!
TOOL GRINDING RULES
Grinding rules for carbide tools are easily available and should be followed carefully. The right wheel, running in the right direction, preserving correct angles are some of the things to watch. Don't guess—grind carbide tools according to rules.
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A Policeman Needs No Buzz-Bomb

SIMON LAKE, inventor of the submarine, has passed away.

Lake drew his inspiration from the master of imagination, Jules Verne, and his "Twenty Thousand Leagues Under the Sea." Verne based his story upon the idiosyncrasies of a multi-millionaire recluse who was not war-minded but who preferred to stay away from people even if he had to go under water to do so.

The submarine was innocently conceived. Its inventor did not design it as a means of sending people to the bottom but for taking them there and bringing them back after a pleasant experience. Unfortunately it has turned out to be purely and simply a weapon of destruction and one not open and aboveboard.

In differing degree, this same thought applies to the airplane. Originally conceived as a means of bringing people closer to heaven it has succeeded in taking them nearer to hell.

The submarine has been devoted 100 pct to destruction. As for the airplane, the ratio between constructive and destructive applications may be measured by our prewar national requirements for passenger service of less than 350 planes as compared with the recent annual requirements of some 70,000 for war.

Far be it from me to say that the world would eventually be better off if the airplane had not been invented. It saved our bacon in Europe and will doubtless do so in Asia as well. And afterwards it can perform constructive miracles in transportation.

As for the submarine, the balance sheet from the standpoint of the welfare of the nation that produced it still shows us in the red, although the account may be balanced before we get through with Japan.

What are we going to have hereafter? A recognition by the sane people of the world that, as agreed at San Francisco, peace is worth the price of enforcement, or a continuance among the enforcers of a competitive armament race?

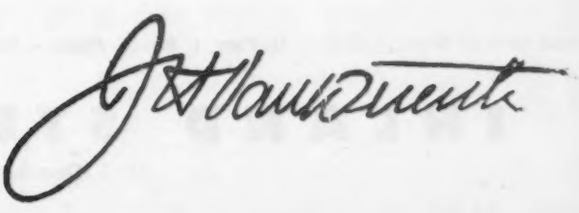
If Russia, Britain and the United States agree to establish a world police force to maintain peace, what is the sense then of a race between the individual policemen to produce the strongest, sharpest and most terrible weapon?

In a community where law and order is the rule, the policemen do not have to sit up nights inventing buzz-bombs. The old-fashioned nightstick plus a Colt .44 will do the trick. Especially in an unarmed community.

Surely if we agree, as we have, upon cooperative effort to enforce peace and thus do away with war, we should call a moratorium on competitive planning for weapon supremacy. What has already been produced should be deadly enough.

Probably the only way to achieve this cessation of deadly and dangerous competition in arms would be for the great powers to agree to an open-door policy with respect to munition improvement. An agreement upon no more tools than necessary to do the job and a frank interchange of information as to what each is doing would go far to relieve humanity of a tremendous burden of both fear and effort.

Perhaps it is too soon to expect that but surely not too soon to think about it.



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The IRON AGE
July 5, 1945

NEWS FRONT

► Confounding skeptics who have deprecated the quality of western ores and coal, Kaiser's 1200 ton blast furnace at Fontana has hung up a daily production record of 1553 tons of pig iron.

Coke consumption per ton of pig iron now runs 1450 lbs. Raising of coke quality has been partially due to blending of about 12 per cent Oklahoma low volatile coal with the Utah product in the coke oven charge.

► Prewar trends in the use of increasingly heavier bumpers on automobiles are likely to be continued on the new models. Great Lakes Steel appears to have the best start on the low alloy high tensile bumpers coming into increasing favor.

Spring Leaf type bumpers used before the war weighed about 40 lbs., while some new designs call for weights up to 100 lbs. A five million car year, using the massive type bumpers, would use 250,000 tons of steel in making them.

Low alloy high tensile steel, while costing 50 to 100 per cent more than orthodox spring steel, is more economical from the processing standpoint.

► A spheroidizing anneal is given SAE 52100 ball bearing steel to increase machinability and to prepare the carbides for subsequent hardening. The most important single factor in a spheroidizing anneal is the selection of the ideal austenizing temperature, which in most cases will be the lowest temperature that will give a microstructure of austenite and non-lamellar carbides.

Size of the carbide spheroid can be controlled in a number of ways. Very slow cooling or holding at temperatures below the A_{e_1} line will cause a coalescense of carbides to larger ones. Size of spheroids can be increased and the annealed steel made softer by holding the bearing steel for a longer period at the austenizing temperature.

Separation of carbide in the austenitic grain boundaries come about by slow cooling a hyper-eutectoid austenite. A cementite network is undesirable from the standpoint of machinability and also because it is a poor initial structure for hardening and annealing. Best results in service are had when the microstructure consists of undissolved carbides in a matrix of martensite.

► Heating ½-in. magnesium plate to a temperature between 500 deg. and 600 deg. F makes possible the forming of a domed cup with 52½ per cent reduction in one draw.

Although elevated temperatures are required for a deep drawing magnesium plate which tends to increase costs and complicate fabricating technique, advantages offsetting these include the possibility of large reductions in a single draw and the elimination of intermediate cleaning and annealing.

► British shipyards, which concentrated on naval vessels during the European war, turned out only 5,723,000 gross tons of merchant shipping in that period, whereas the U. S. built over 30,000,000 tons from Pearl Harbor to May.

And: Whereas the British talk of increasing their postwar exports by 50 per cent, the U. S. is talking of a 200 per cent increase. Consequently, the British appear just as nervous about the U. S. as many in this country appear to be about them.

► In England today £1 ($4) in the housewife's purse will buy ouly 8s 4d ($1.65) worth of real goods by the 1914 standard, according to the British Chancellor of the Exchequer. Taking into account both depreciation and present taxation, it requires £4 10s ($18) today to buy £1 ($4) of 1914 real goods.

► Crucible Steel in the Pittsburgh district is operating at 40 per cent of capacity in carbon steel due to closings for extensive repairs. Electric furnaces are completely shut down for lack of business.

► Western Senators pressing for disposal of steel plants predict complete closing of Geneva and Fontana "before autumn", unless immediate disposal action is taken.

► The first step in declaring the Homestead, Pa., works of Carnegie-Illinois surplus has been taken, as the WPB has declared the works "no longer critical". Next action must be taken by the Surplus Property Board, and the Defense Plant Corp.

► Filed last week in Denver was a complaint by the Justice Dept. against the Cement Institute for alleged violations of the Sherman Act by use of a multiple basing point pricing system. The action was one of Att. Gen. Biddle's last official acts.

Metallurgy of SAE 52100 Ball

ANTI-FRICTION bearing rings, balls and rollers are made of the finest quality electric furnace steel of the SAE 52100 chromium type. The material for bearings must be capable of being processed to resist wear, fatigue and plastic deformation, much of which is accomplished by careful heat treatment.

Typical analyses of SAE steels studied are given below:

	Element, Per Cent				
Steel No.	C	Si	Mn	Ni	Cr.
I ...	1.04	0.34	0.45	0.13	1.44
II ..	0.96	0.36	0.29	0.16	1.03

Prior to machining and hardening, the structure of SAE 52100 is made up of spheroids of carbide in a matrix of ferrite. The steel is spheroidized for the purpose of softening it for machining and for preparing the carbides for subsequent hardening. Bars and tubes that are machined into bearing parts are usually purchased as "spheroidize annealed." The consumer requires a fully spheroidized structure free from elongated carbides and pearlite, as non-uniformity of carbide shape and size affects the quality of machined surfaces. Spheroid size is often specified within limits as the particle size apparently affects the rate at which carbides go into solution during the hardening heat. Variations would produce irregularities in hardening.

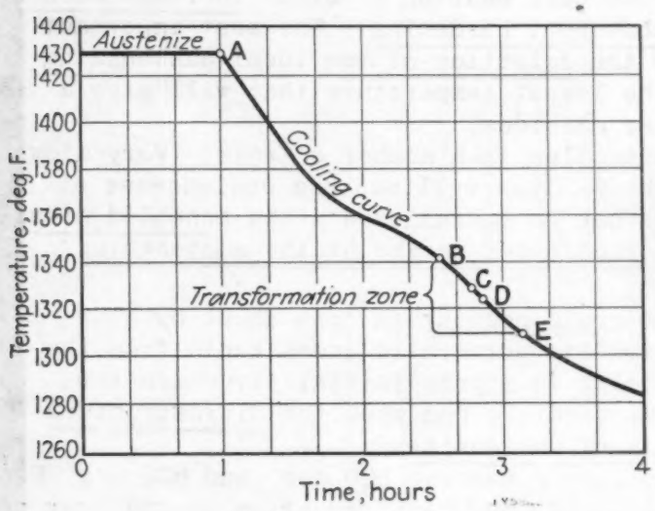


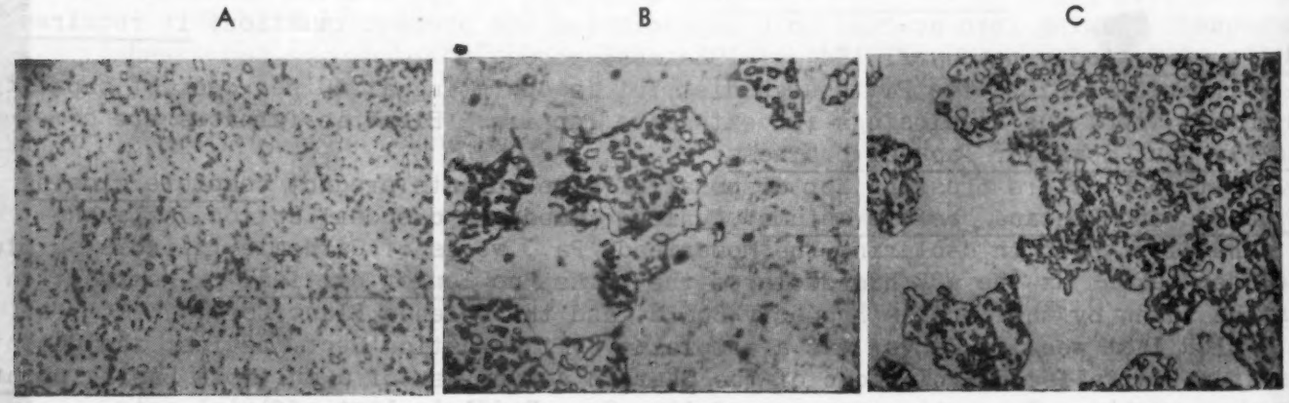
FIG. 1—Time-temperature cycle for samples transformed during a slow cool. Letters refer to photomicrographs, Fig. 2.

The problems that confront the metallurgist and heat treater can readily be understood when one considers that many parts for ball and roller bearings are made to tolerances of hundred thousandths of an inch and, what's more, on a production basis. Some of the metallurgical aspects of bearing manufacture are discussed in the following paragraphs.

Spheroidizing Anneal

The spheroidite structure consists of two constituents, carbide particles and ferrite, and is a direct transformation product of a tailor made austenite, or more properly, an austenite-iron carbide mixture. It appears that a successful spheroidizing anneal depends on keeping the top annealing temperature below the A_{cm} line and in the austenite-cementite field of the equilibrium diagram for the steel. This area will for all practical purposes correspond to the austenite-cementite field of the iron-iron carbide diagram. For a slow-cooled steel which has been thoroughly homogenized and consists entirely of uniform austenite, the transformation product is pearlite. A steel whose structure at the austenitizing temperature is heterogeneous and is com-

FIG. 2—Progress of transformation furnace cool of steel I illustrated photomicrograph A was austenitized in water. The sample shown in after cooling to 1342 deg.; that that in D after being cooled to being cooled to 1310 deg. The and held 60 hr. at this temperature.



Bearing Steel

By Lt. (j.g.) R. J. HAFSTEN
U.S.N.R., Philadelphia

. . . For the purpose of softening SAE 52100 steel for machining and for preparing the carbides for subsequent hardening, the steel is given a spheroidizing anneal. With the aid of numerous photomicrographs, the author shows the factors influencing carbide spheroid formation, including the ideal austenizing temperature for this purpose and control of spheroid size. He concludes with an analysis of a properly hardened structure for ball and roller bearing service.

posed of austenite and residual carbides and possibly concentration gradients of carbon in gamma iron, on the other hand, will transform on slow cooling to spheroids of cementite and ferrite. It becomes more evident that the strong nucleating power of residual carbides interferes with the normal precipitation of pearlite and causes the carbide to deposit on the residual carbides already present.

To clarify the mechanism of the spheroidize anneal, the transformation of austenite to spheroidite during a furnace cool was observed. A similar procedure to that used in construction of the familiar "S" curve was adopted. Specimens were removed at various temperatures during the cool and quenched in water. Any untransformed autenite that existed in the specimen at the time of its removal would appear on metallographic examination as martensite, thereby revealing the nature of the austenite-spheroidite transformation. Specimens were austenitized at 1430 deg. F. for 1 hr. The time-temperature curve during cooling is shown in Fig. 1. A picture of the transformation is shown by the photomicrographs of Fig. 2. Transformation to spheroidite begins quite rapidly, for this specific cool, at 1342 deg. F. and ends 35 min. later at a temperature of 1310 deg. Fig. 2A shows the structure of a specimen austenitized at 1430 deg. and quenched. This structure represents the austenite-carbide mixture from which the balance of the spheroidal structures of Fig. 2 are derived. The undissolved carbides of Fig. 2A are responsible for the austenite transforming to spheroidite instead of pearlite on slow cooling. Fig. 2F shows a sample that received the same cool as the others but was not removed until it remained 60 hr. at 1275 deg. The additional time of holding resulted in coalescence of cementite to larger spheroids. Control of spheroid size will be discussed in greater detail later.

of austenite to spheroidite during the in Fig. 1. The specimen shown in at 1430 deg. F. for 1 hr. and quenched photomicrograph of B was quenched in C after being cooled to 1330 deg.; 1325 deg.; and that in E after sample of F was cooled to 1275 deg. Etched in picral magnification 2000X.

Austenitizing Temperature

The most important single factor in a spheroidizing anneal is the selection of the ideal austenitizing temperature, which in most cases will be the lowest temperature that will give a microstructure of austenite and non-lamellar carbides. As was stated previously, the higher the austenitizing temperature with respect to the critical (A_{e_1}) the greater the tendency for austenite to transform to pearlite on slow cooling, and the closer the annealing temperature approaches the critical (A_{e_1}) the greater the tendency of the annealed steel to be spheroidal. Pearlite is a handsome aggregate in its place but when present in a structure that should be 100 per cent spheroidite it is unwelcome, and makes metallurgists wish they were back on the farm getting eggs from chickens or chickens from eggs, whichever it is. In an anneal, pearlite appears when the residual carbide nuclei are reduced in number or increased in size by high austenitizing temperatures, to the extent that they are no longer able to influence austenite into transforming to spheroidite.

A few examples of the relationship of austenitizing temperature and structure formed during an anneal are shown in Fig. 3. The structure that exists at the various austenitizing temperatures and determines whether an austenite will transform

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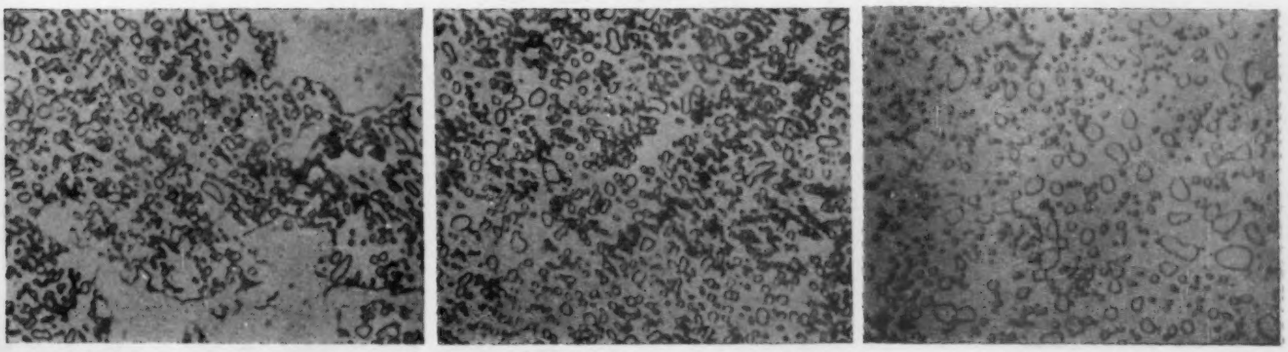

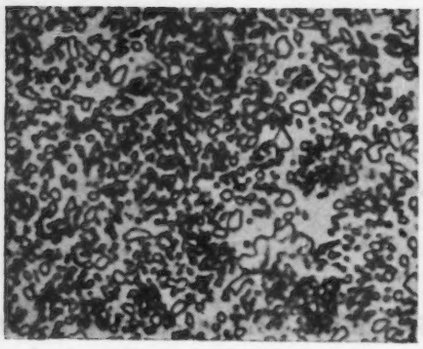

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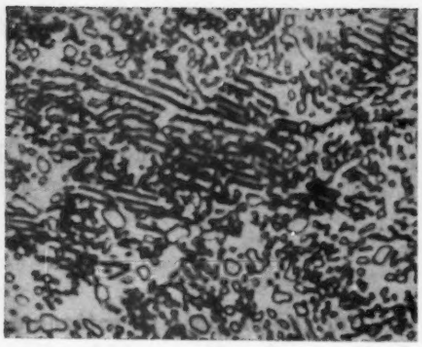

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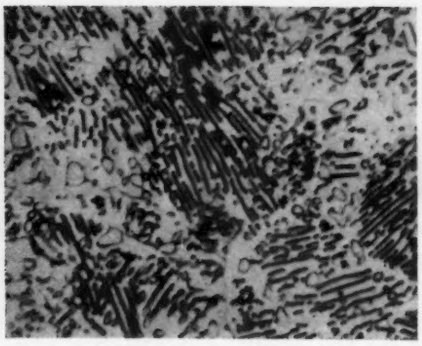

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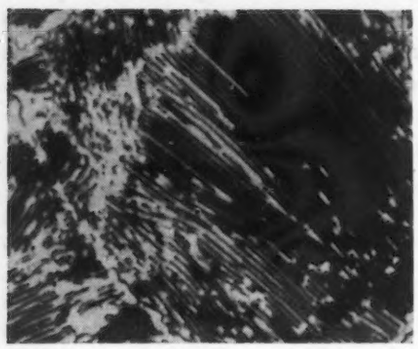

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FIG. 3—Effect of austenitizing temperature on structure formed below the critical (Ael) for steel II. All specimens were cooled to 1340 deg. F. and held 4 hr. at this temperature, after austenitizing as follows: The sample shown in photomicrograph A was austenitized at 1500 deg. F. for 4 hr.; that at B at 1550 deg.; that at C at 1600 deg. and that at D at 1800 deg. Picral etch; magnification 1500X.

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to pearlite or spheroidite, below the critical (A_{e_1}) is shown in Fig. 4. These microstructures were obtained by austenitizing specimens at a specific temperature followed by a water quench. On metallographic examination the austenite would appear as martensite and the residual carbides would, of course, be unchanged and are the same as to number, size and distribution as they were at the austenitizing temperature. By imagining the martensite to be austenite, one can readily visualize the character of the structure that existed at the various austenitizing temperatures and associate them with the austenite transformation product formed below the critical, during an annealing cycle. For example, the annealed structure of Fig. 3A is the transformation product of the austenite-carbide mixture of Fig. 4A and the pearlite plus spheroidite structure of Fig. 3C is the transformation product of the austenite-carbide mixture of Fig. 4C.

An austenitizing temperature of 1500 deg. F. is the maximum temperature at which steel II can be heated and subsequently cooled to give a spheroidal structure. It is better insurance to austenitize at temperatures below 1500 deg. as this temperature represents a maximum. Examination of the microstructure of a specimen austenitized 4 hr. at 1500 deg. and quenched in water reveals a uniform dispersion of many very small residual carbides. If a steel is slow cooled from 1550 deg., which is also the temperature pearlite makes its appearance (refer to Fig. 3B), it will be seen that the additional 50 deg. has reduced considerably the number of nuclei, making this austenite-carbide mixture ineffective in producing a completely spheroidal structure. At 1600 deg. there are only few small

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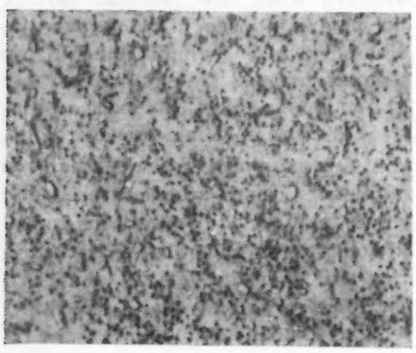

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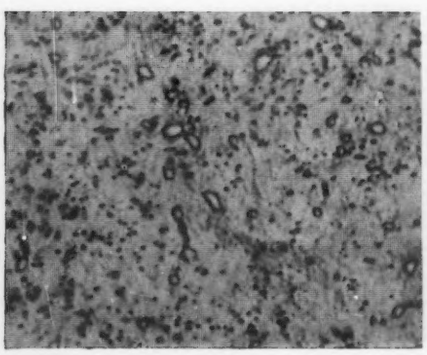

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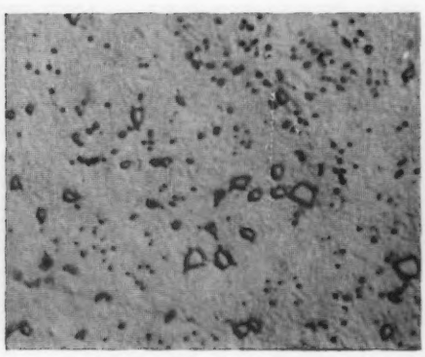

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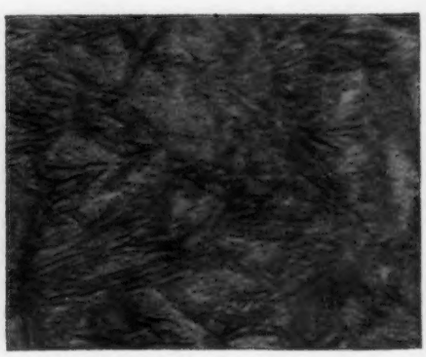

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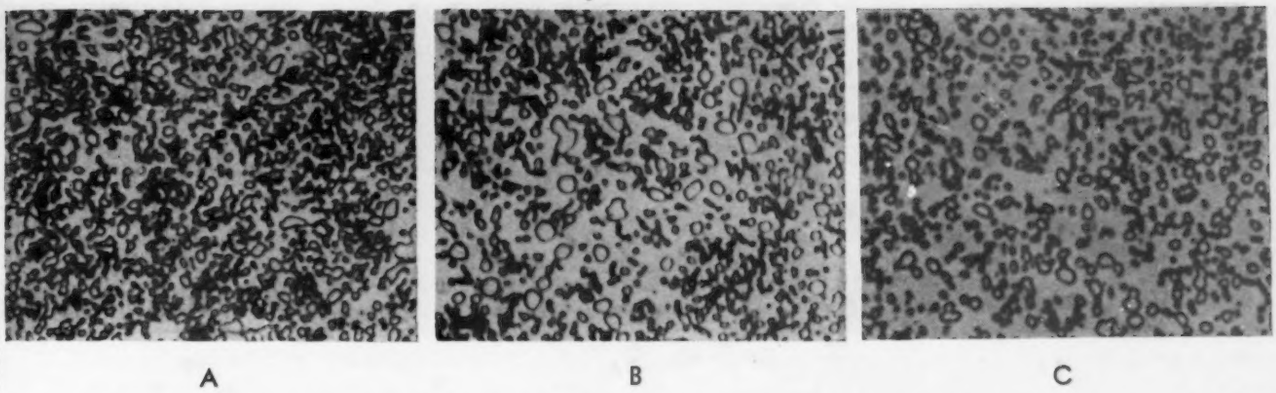
FIG. 4—Effect of austenitizing temperature on size and quantity of residual carbide nuclei in steel II. All specimens were quenched in water from the following austenitizing temperatures: The sample shown in photomicrograph A was quenched after 4 hr. at 1500 deg. F. that in B after 4 hr. at 1550 deg.; that in C after 4 hr. at 1600 deg. and that in D after 4 hr. at 1800 deg. Etched in picral, magnification 1500X.



A B C

FIG. 5—Effect of treatments to increase spheroid size in steel II. The specimen at A was austenitized at 1500 deg. F., cooled to 1340 deg. and held 4 hr. at this temperature; that of B was preheated at 1360 deg. for 48 hr. before austenitizing at 1500 deg., cooling to 1340 deg. and holding 4 hr. at this temperature; that of C was austenitized at 1500 deg. cooled to 1340 deg. and held 4 hr. at temperature, this cycle being repeated three times. Picral etch, magnification 1500X.

nuclei and the ineffectiveness of this austenite-carbide mixture to transform to spheroidite can be seen from the photomicrograph of Fig. 3C. At 1800 deg. no nuclei are left and austenite formed at this temperature transforms on annealing only to the lamellar structures.

Control of Spheroid Size

The size of the carbide spheroid can be controlled in a number of ways. Very slow cooling or holding at temperatures below the A_{e_1} line will cause a coalescense of carbides to larger ones, as was the case of the specimen of Fig. 2 that was cooled to 1275 deg. F. and held 60 hr. at this temperature. It was found that the size of spheroids could be increased and the annealed steel made softer by holding the bearing steel for a long period of time at the austenitizing temperature. The decrease in hardness and accompanying increase in spheroid size is due to the agglomeration of residual carbides in the austenite. The specimen of Fig. 5B, for example, was preheated at 1360 deg. F., which is just below the A_{e_1}, for 48 hr., then austenitized at 1500 deg. for 4 hr., followed by a cool to 1340 deg. Specimens were held at this temperature for 4 hr. It can be seen that the carbide spheroids are much larger for the same reason that the carbides coalesced and formed larger spheroids that are more resistant to solution during subsequent heating prior to the anneal cool.

A repeat anneal cycle also is very effective in increasing spheroid size. Fig. 5A shows the structure of steel II that received a typical one cycle anneal and Fig. 5C is a photomicrograph of a specimen that was given the same cycle three times. The repeat cycle is very effective in increasing the spheroid size; in fact, it was so potent that after

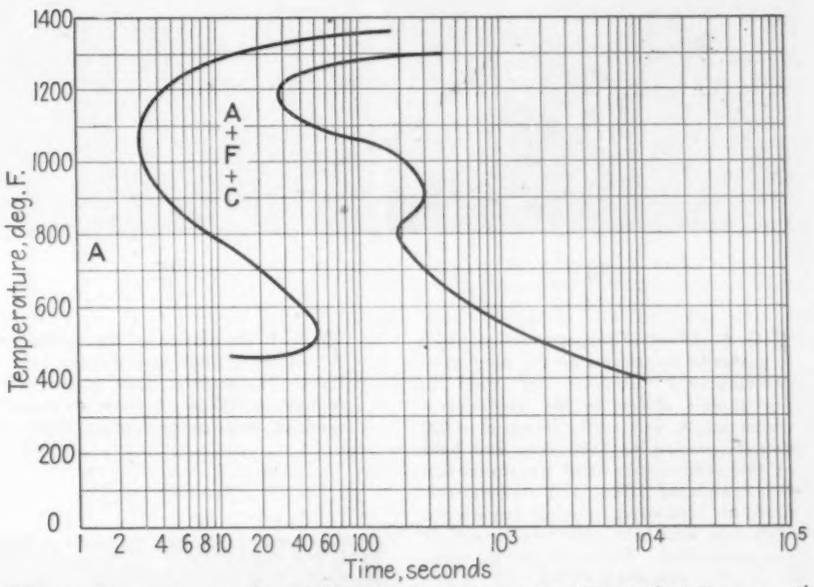


FIG. 6—S-curve for type I steel (C-7.02; Mn-0.36, Si-0.33; Ni-0.20, Cr-1.41 per cent) austenitized at 1550 deg. F. An austenitizing temperature of 1550 deg. failed to dissolve all carbides. Note absence of pro-eutectoid field. Data for construction of curve secured from United States Steel's "Atlas of Isothermal Diagrams."

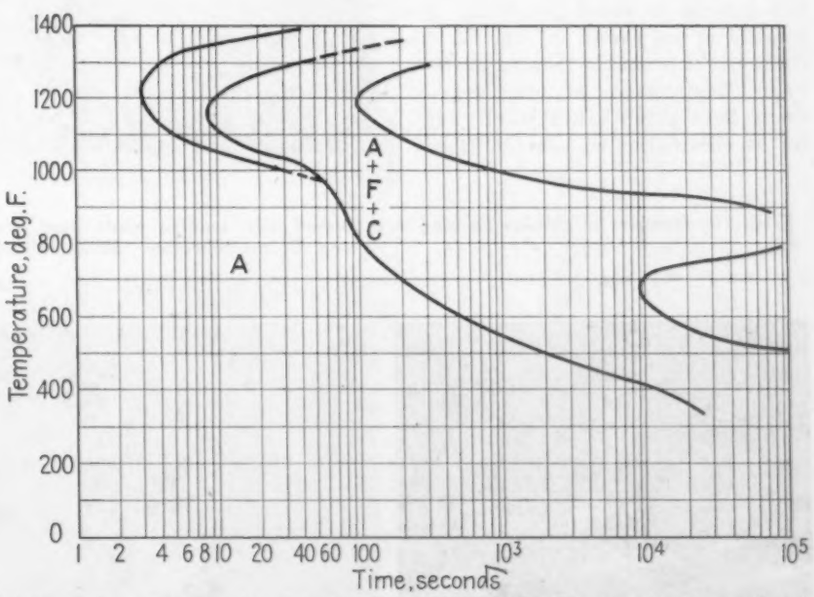
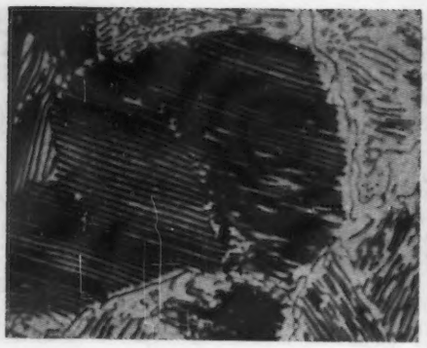
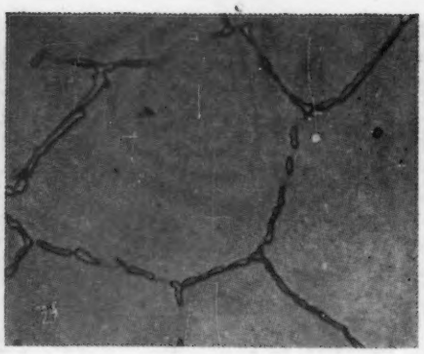


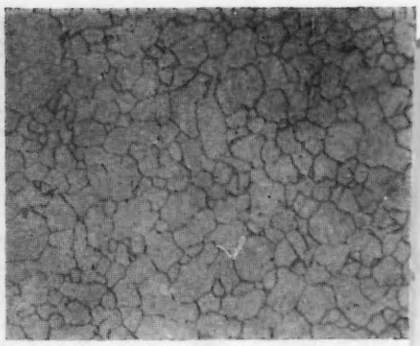
FIG. 7—S-curve for steel I austenitized at 1950 deg. F. This temperature resulted in substantially complete solution. Note pro-eutectoid field. Data for construction of curve secured from United States Steel's "Atlas of Isothermal Diagrams."



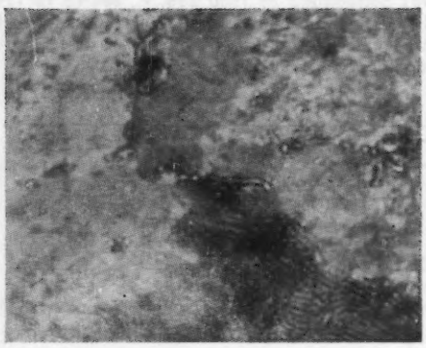
8A



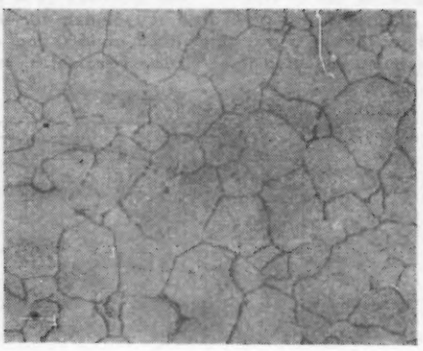
9A



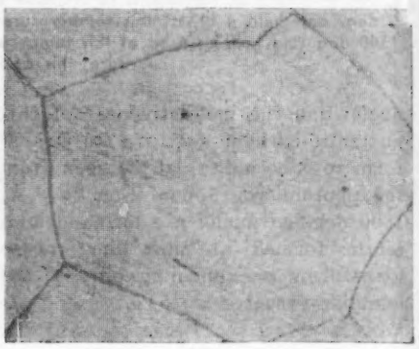
9B



8B



9C



9D

FIG. 8—Effect of temperature at which austenite transforms on the amount of pro-eutectoid cementite for steel II. The sample shown by the photomicrograph at A was austenitized at 1800 deg. F., cooled to 1360 deg. and held at this temperature until transformation was completed. That of B was austenitized at 1800 deg., cooled rapidly to 1200 deg. and held until transformation was completed. Etched in picral; magnification 1500X.

FIG. 9—Formation of the carbide net work in steel II. All specimens were furnace cooled to 1400 deg. F. and held 5 hr. at temperature, after austenitizing as follows: The sample shown in photomicrograph A was austenitized at 1800 deg., magnification 1000X. B same treatment as A, magnification 100X; C was austenitized at 2000 deg., magnification 100X, while D was austenitized at 2200 deg., magnification 100X. Picral etch.

three cycles the carbide nuclei were no longer capable of producing a completely spheroidal structure as pearlite was present in small quantities. The pearlite is not shown in Fig. 5C. Although it is probable that an austenitizing temperature of 1450 deg. F. would have given better results insofar as elimination of pearlite is concerned, nevertheless this method is a satisfactory one for controlling spheroid size.

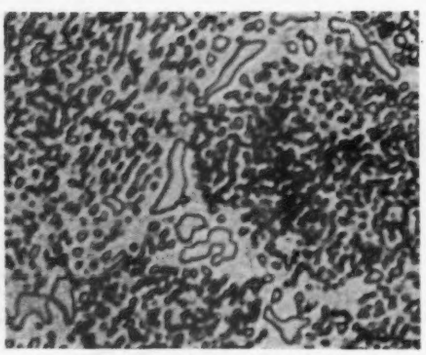
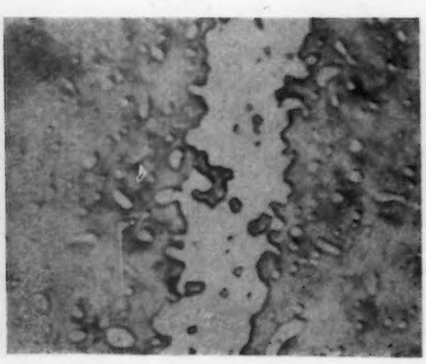


FIG. 10—Effect of prior heat treatment on microstructure of annealed SAE 52100, steel II. The sample had been slow cooled from 2000 deg. F. to produce a structure of coarse peralite and pro-eutectoid carbide in the former austenite grain boundaries, then austenitized at 1500 deg. for 4 hr., cooled to 1340 deg. and held at this temperature for 4 hr. Etched in picral; magnification 1500X.

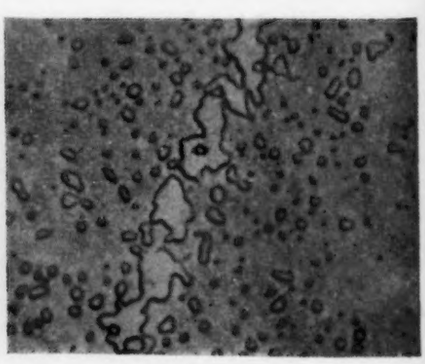
FIG. 11—Examples of carbide banding in a finished roller bearing made from steel II. Photomicrograph A, magnification 250X; B and C, magnification 1500X. Picral etch.

A

B



C



Separation of carbide in the austenitic grain boundaries comes about by slow cooling a hyper-eutectoid austenite. A cementite network is undesirable from the standpoint of machinability and also because it is a poor initial structure for hardening and annealing. It can be noted from the S-curve of Fig. 6 that the austenitizing temperature of 1550 deg. F. failed to bring about complete solution of the carbides in austenite with the result that the austenite behaves as if it were eutectoid. Consequently no pre-eutectoid field exists and no matter how this austenite were cooled, no cementite would form in the austenite grain boundaries; however, the higher austenitizing temperature of 1950 deg. F. (Fig. 7) resulted in substantially complete solution of carbides. The austenite of the 1950 deg. F. temperature is hyper-eutectoid and will, on slow cooling, reject cementite in the grain boundaries. It is this pro-eutectoid constituent that is sometimes found in bearing steels.

The quantity of pro-eutectoid constituent formed below the A_{e_1} line decreases as it approaches the knee of the isothermal curve at approximately 1150 deg. F. Examples of this are shown in Fig. 8. Besides the pro-eutectoid field shown in the isothermal diagram (Fig. 6) the area between the A_{cm} and A_{e_1}, where austenite is only partially stable, also produces a carbide network, providing the austenitizing temperature is above A_{cm} and the steel is slowly cooled or held in the temperature range that corresponds to this area. Fig. 9 reveals a network formed in this manner. This method of heat treatment gives an excellent procedure for determining grain size of SAE 52100 and other hyper-eutectoid steels. Examples of cementite outlining austenite grains are shown by the photomicrographs of Fig. 9. Knowing how the network originates, measures can be adopted to prevent its occurrence by controlling the austenitizing or annealing temperature and the rate of cool from this temperature.

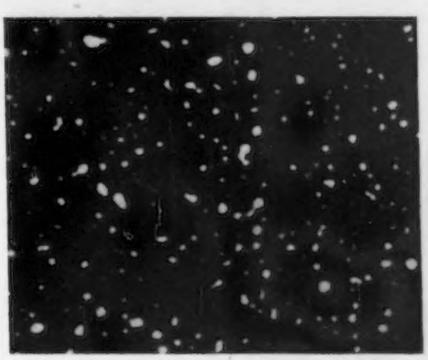
Effect of Prior Structure

It was found that the initial structure of the steel before spheroidize annealing exerts an influence on the final annealed structure. It is good practice to normalize SAE 52100 before annealing for the purpose of providing a suitable starting structure. SAE 52100 type steels do not possess unusual stability in the pearlite range, therefore steel normalized from temperatures above the A_{cm}, transforms to fine pearlite. Fine pearlite in contrast to coarse pearlite has proved to be a very satisfactory initial structure for spheroidize annealing. Fig. 10 shows a photomicrograph that might appear in a bad dream of an overtaxed metallurgist. It represents a specimen that had been given an annealing cycle that ordinarily would produce a spheroidal steel. The initial structure of this specimen before annealing consisted of coarse pearlite and massive pro-eutectoid cementite in the former austenite grain boundaries. From the standpoint of bearing manufacture this microstructure is very unsatisfactory. The network was retained since the austenitizing temperature of 1500 deg. F. was too low to effect complete solution. The elongated carbides are due to coarse lamellae of pearlite retaining their shape. It is evident from the microstructure of the annealed SAE 52100 steel of Fig. 10 that prior or initial structure is important to a good anneal.

The literature on the subject of ball and roller bearing steels is limited. The author records the following for further reference: "Chromium Steel for Ball Bearings, Inspection and Heat Treatment,' by A. S. Jameson, METAL PROGRESS, May, 1941; "Spheroidize Annealing of SAE 52100 Steel," by R. J. Hafsten, METAL PROGRESS, November, 1942. See also "The Annealing of Steel," by Peter Payson, THE IRON AGE, June 24, July 1, 8, 15 and 22, also Sept. 9, 1943, now available in reprint form.

o o o

FIG. 12—Steel II—Microstructure of properly (A) and improperly hardened (B) bearings of SAE 52100 steel. Sample shown by photomicrograph A was austenitized at 1500 deg. F. and quenched into oil. Specimen B was austenitized at 1800 deg. and quenched into oil. Nital etch, magnification 1500X.



A

B

There is a condition known as carbide banding that is prevalent in steels of the SAE 52100 type. The carbide streak, as it is sometimes called, is an accumulation of relatively large carbide particles. They are very resistant to heat treatment and as far as the author is aware, no effective procedure has yet been devised for their complete elimination. Examples of the structure are shown on Fig. 11.

Experience has proved that best results in service are had when the microstructure of the bearing steel consists of undissolved carbides in a matrix of martensite. The carbides should be uniform as to size and dispersion. Hardness of the structure will vary from Rockwell C 60 to C 64 depending on the part and treatment. The hardening range for SAE 52100 steel is usually from 1480 to 1580 deg. F. and the quenching medium, oil. In most cases, quenched parts are stress relieved at approximately 325 deg. F. Fig. 12A shows a microstructure of a properly hardened bearing. The microspecimen was purposely etched dark to accentuate the carbides. Fig. 12B is a photomicrograph of an improperly hardened bearing. As can be seen, the structure is composed of high carbon martensite and retained austenite. This structure was obtained by quenching from 1800 deg. F. which is a temperature at which the austenite of an SAE 52100 steel is hypereutectoid.

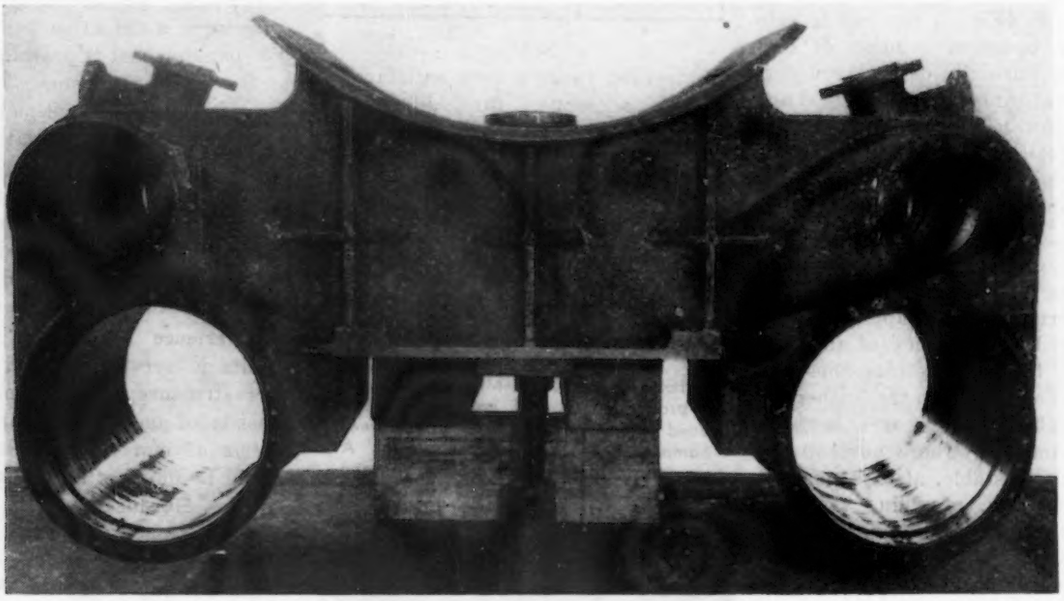
All the foregoing sums up the careful treatment necessary to assure smooth machining, and hardening to a high quality bearing that will be resistant to wear, fatique and deformation.

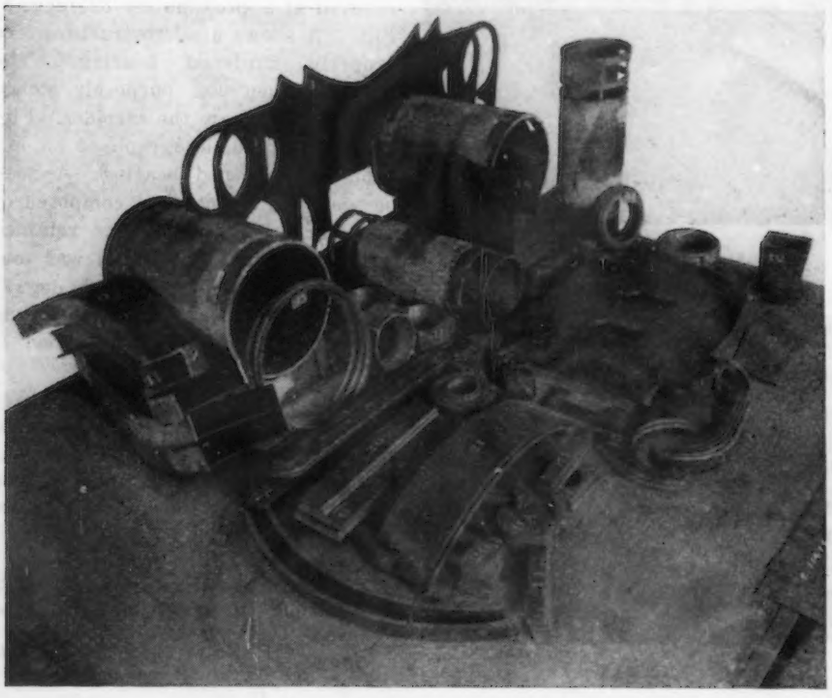
Opinions or assertions contained in this article are private ones of the writer and are not to be construed as official or reflecting the views of the Navy Department or the Naval Service at large.

Locomotive Cylinders Fabricated by

THE progress of arc welding as a fast, economical fabricating medium has been strongly emphasized in the shops of the nation's railroads where the electric arc is being applied to a greater extent than ever before in producing essential equipment.

One of the most interesting weld-fabricated units which exemplify the strides that have been made in the building of railroad equipment is the integral locomotive cylinders and saddle. The step-by-step procedure currently used in the fabrication of such units at the Altoona shops of the Pennsylvania Railroad is shown in the accompanying pictures. Except for tack welding, ¼ in. electrodes of AWS E-6012 classification are used in fabricating the assembly from rolled plate.





ABOVE

FIG. 1—The completed set of cylinders and saddle, welded and ready for installation in the locomotive. The unit weighs about 26 tons.

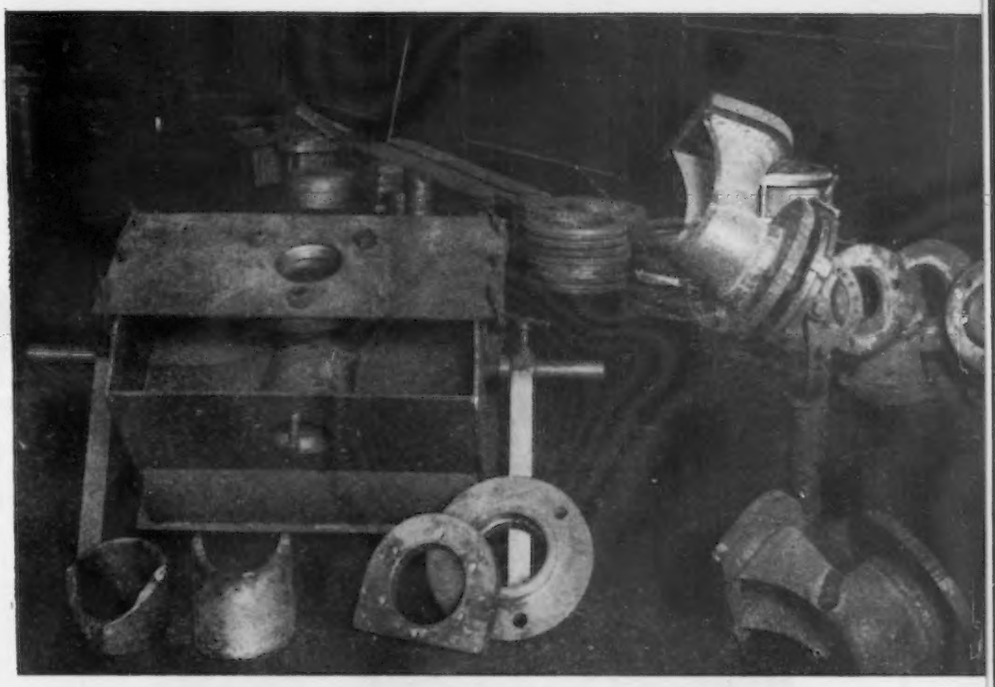
o o o

LEFT

FIG. 2—Showing the 77 different parts, including ten subassemblies, required to produce the assembly of two cylinders and saddle. The various shapes are flame cut from plate and are either formed by rolling cold or pressing hot.

ed by Welding

Photos and data courtesy
Lincoln Electric Railway Sales Co., Cleveland



UPPER RIGHT

FIG. 3—A close-up of the drifting valve and welded steam pipe connection. The component parts are shown in the left foreground with completely welded unit at right foreground. The parts range in thickness from 1 to 2 in. A simple jig (left), with clamp-down plates is used for tacking the valve parts after which the assembly is finish welded in the pivoted yoke fixture (right.)

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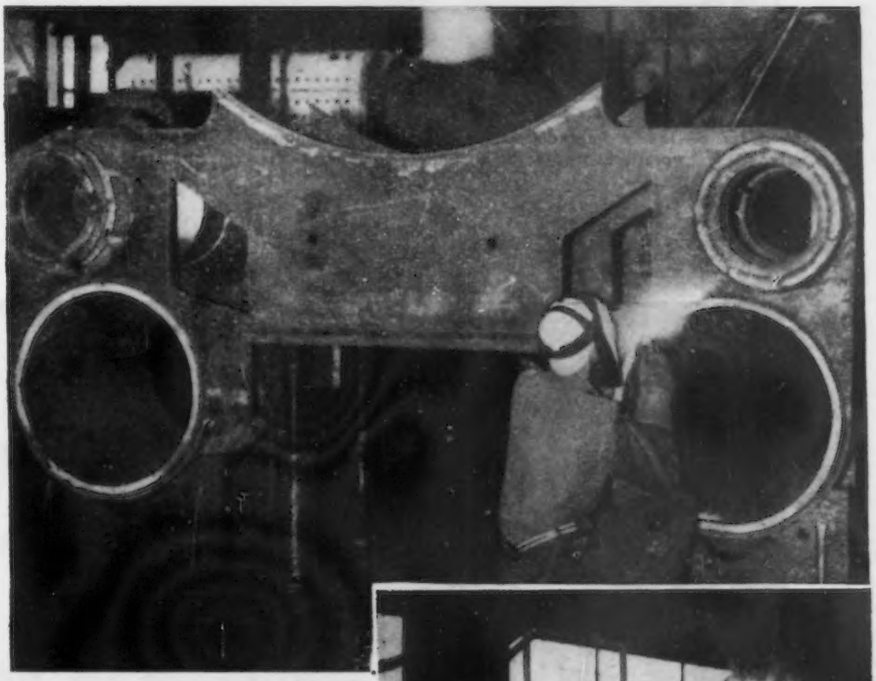

RIGHT

FIG. 4—The various parts are assembled on V-blocks and tack welded with 5/32 in. mild steel rod to assume the final shape of the completed structure.

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BELOW

FIG. 5—The assembly is first placed in a horizontal trunnion fixture (Left) for the best down-hand positioning of certain finish welds, then positioned in a vertical rotating fixture (right) to apply other finish welds. Both fixtures are of the double pedestal type, the work being turned by hand to effect best welding positions.

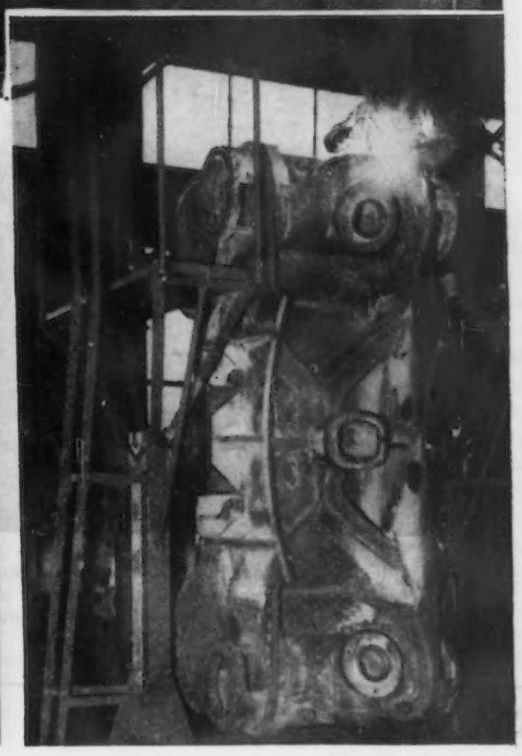

FIG. 6—The all-welded cylinder and saddle assembly with annealing furnace seen in background. Here the work is heated to 1500 deg. F. to remove all shrink stresses in both parent material and welds.

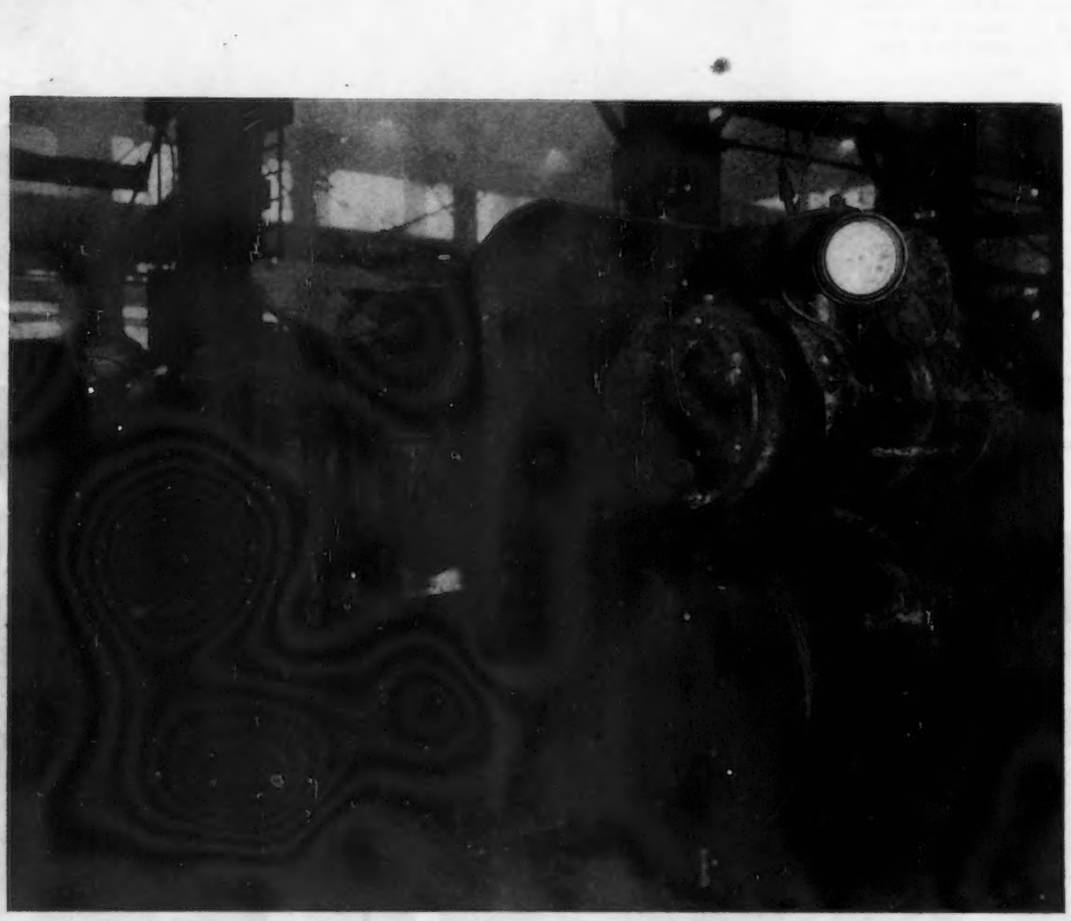

FIG. 7—High quality of welded construction is evidenced by testing the cylinder and valve chambers under 320 lb. water pressure to assure absence of defects. Although the work is thoroughly inspected during this operation the company reports that defects are seldom found.

SETUP CHARTS

For Automatic Screw Machines

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. . . In the fourth and concluding article of the series, the author presents charts for the graphical solution of problems involving speeds and feeds on Davenport and Brown & Sharpe automatic screw machines. The charts are particularly useful for these machines because the lack of direct relationship of feed per spindle revolution makes a series of approximations necessary, ordinarily involving repeated calculations, which are herein eliminated. With these charts, problems involving speeds and feeds and related gear ratios can be solved in a few minutes.

o o o

By JOHN J. MEADOWS

Development Engineer, Development Division, Curtiss-Wright Corp.

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FROM the point of view of charting setup data, the Davenport automatic screw machines represent a departure from those considered in the first three articles. In these machines the feeds and speeds are not interrelated directly as in the Gridley type machines. Instead, the feed depends upon the spindle speed and the rate of rise of the cam. This last depends upon the speed of rotation and slope of the cam. Since these are selective quantities, and since the feed drive is independent of the spindle drive, they are arrived at by successive approximations.

Under the usual method of procedure use is made of tables of cycle time to arrive at the necessary data by which to select the feed gears. The next step is to determine the depth of cut and from this to select a desirable cam. Assuming a desirable feed, its value is divided into the size of cam. This gives the required numbers of revolutions of the main spindle to make the cut. From the speed of the spindles the elapsed time can be determined. These elapsed times have been tabulated for convenience in the Davenport manual. It is usually necessary, however, to use a cycle time other than that computed. When this is done a correction must be made by means of percentage slides on the cam follower blocks. The setting of these slides is determined by dividing the desired cycle time by the cycle time to be set on the machine.

Usually when the above procedure is followed to determine a setup, one or more of the operations will appear to take too long. The designer or operator is inclined to think of the setup in terms of time instead of feed, and arbitrary changes in setup are often made without checking the feeds on the machine. This results in unsatisfactory performance and operating difficulties that could be avoided. In order to eliminate this situation and simplify the work necessary to determine a proper setup, the accompanying Davenport charts were developed.

There are three setup charts (Figs. 27, 28 and 29) and one proportionate feed chart (Fig. 30) provided. The setup charts cover three ranges of feeds governed by the compound gears on the machine. The proper setup chart is selected and is entered at the desired spindle speed along the left margin of the chart, projecting to the right until the spindle speed curve is intersected. The nearest encircled dot gives the nearest practical speed on the machine. The vertical line through this encircled dot is followed to the bottom of the chart where the proper spindle change gears are determined. The desired feed is then selected along the right-hand side of the chart and the horizontal line followed to its intersection with the proper cam curve. From this intersection the vertical line is followed to its intersection with the spindle speed line. From this latter intersection the nearest feed change gear curve is selected and this gear installed in the machine.

For check, the vertical line through this intersection is then followed to its intersection with the cam curve previously referred to and from this intersection the actual feed produced by the cam determined. With this value the feed percentage chart, Fig. 30, is entered and the corresponding horizontal line followed to its intersection with the 100 per cent curve. From there the vertical line through this intersection is followed to the horizontal line corresponding to the desired feed. At this intersection the percentage of feed is determined from interpolation from the percentage curves and this value set on the cam follower block. With this setting on the machine the actual desired feed will be obtained on the cutting tool.

Let it be assumed that a spindle speed of 1900 r.p.m. is desired and for a particular operation, a feed of 0.006 in. per rev. is required with a 3/32 in. cam movement. Since each

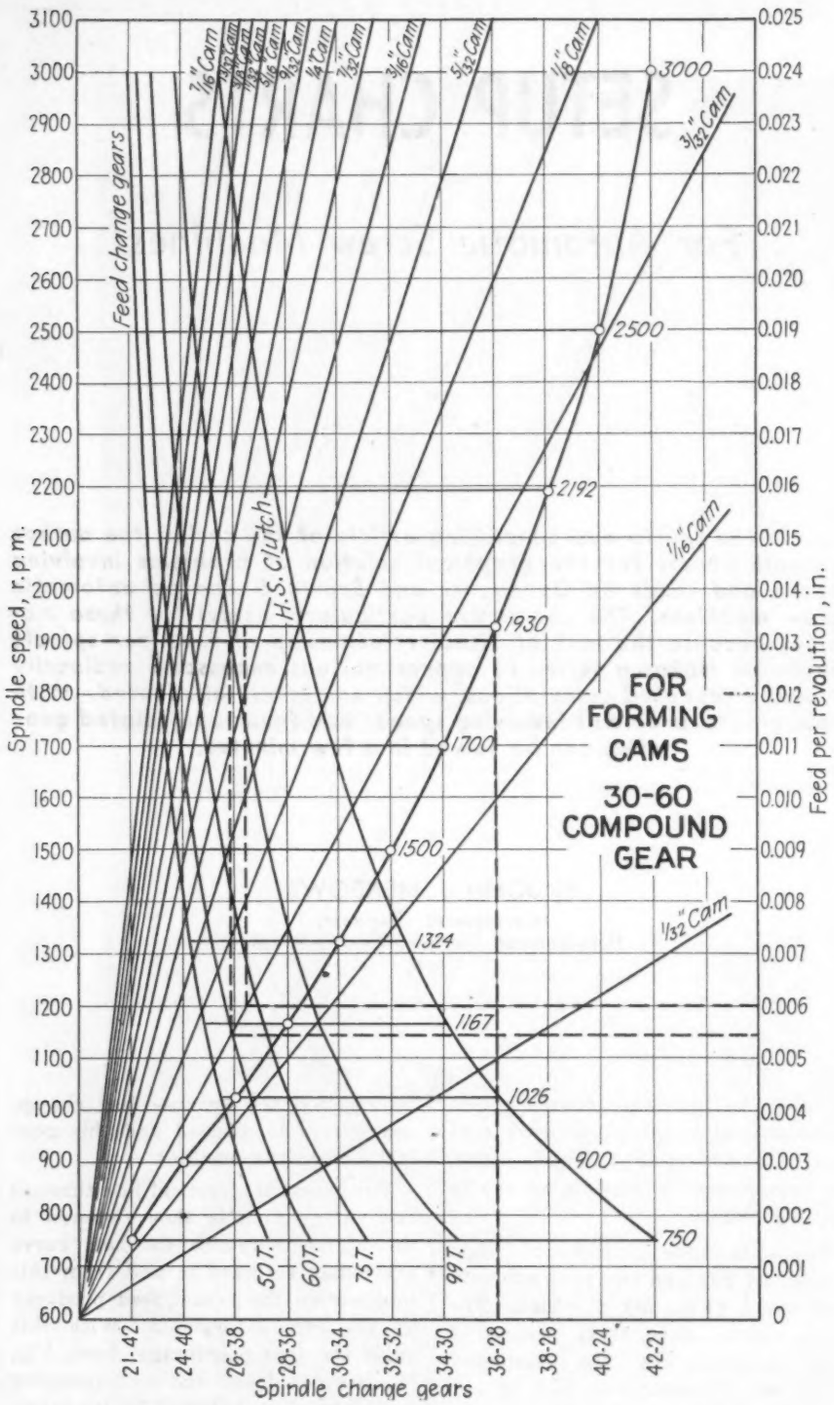


FIG. 27—Change gear setups for high speed Model B Davenport automatic screw machines using 30-60 compound gears.

tool has an individual cam each would be considered in a similar manner. A casual survey of the charts will indicate that the 0.006 in. feed line intersects the 3/32 in. cam curve within the range of the feed curves on the chart coinciding with the 30-60 tooth compound gear. This chart, Fig. 26, is then entered along the left-hand margin at 1900 r.p.m. and the spindle curve interesected about the middle of the chart. The nearest encircled dot indicates the nearest obtainable speed to be 1930 r.p.m. Tracing the vertical line down through this intersection it will be determined that the 36/28 tooth combination of change gears will be required. This will be the speed of all spindles on the machine.

The chart is then entered along the right-hand margin at 0.006 in. feed and the horizontal line traced to its intersection with the 3/32 in. cam curve. From this intersection the vertical line which passes through it is traced to its intersection with the 1930 r.p.m. spindle speed line. This will be about a quarter of a division to the right of the nearest feed gear curve, namely the 99 tooth curve. If this curve is selected and the 99 tooth gear used, then the trace is shifted to the intersection of the 99 tooth curve and the 1930 r.p.m. line and a check made to determine the actual feed that such a combination will give. This is done by tracing the vertical line from this intersection to its intersection with the 3/32 in. cam curve. It will be found that this combination will produce a 0.0054 in. feed. This will be 10 per cent lower than desired which will result in an increase in cycle time and a proportional loss in production.

It is possible in this machine, however, to obtain exact feeds by means of the proportional settings on the cam follower blocks. Therefore, reference is made to the proportional chart, Fig. 30, which is entered at the horizontal line representing 0.0054 in. feed. This is traced to its intersection with the 100 per cent curve. The vertical line through this intersection is then traced to its intersection with the 0.006 in. feed line. Interpolation of the ray curves on either side of this point will indicate a 111 per cent correction on the cam follower block. This will give the exact feed of 0.006 in.

For threading on these Davenport machines definite fixed gear ratios are used, 4:3 for steel and the full spindle speed for brass. Variations in the number of threads per inch and the number of threads cut on the stock are made through the use of different cams. These should be determined from the Davenport handbook. High speed drills are usually driven at the fixed ratio of 2.2:1 in a live spindle using a 49 tooth driver and 44 tooth driven gear. The driver gear is mounted on the main drive shaft.

B & S Automatics

Brown & Sharpe automatics are single spindle machines having a multi-tool turret which operates in sequence for end operating tools, and cross slides for the usual forming and cut-off operations. The spindle is belt driven through change gears in order to provide a multitude of speeds. This range is amplified by means of different size pulleys in the belt drive. High and low speed clutches are provided in order to provide two speeds on the spindle. One of these speeds can be reversed if desired.

The feed is accomplished by means of a multi-lobe disk cam driven

through change gears from a main shaft having a fixed speed. The feed depends upon the spindle speed, the rate of rise of the cam lobe and the speed of rotation of the cam. These cams must be designed for specific jobs and in order to accomplish this with some facility the cam surface is divided radially into 100 parts. Each lobe is then designed on the basis of the depth of cut plus tool clearance for indexing purposes. The desired feed is divided into the depth of cut to determine cutting time and an arbitrary slope assumed to close the clearance distance. For a particular spindle speed a definite number of revolutions will be made during each specific cutting time. These values have been tabulated for each machine in the Brown & Sharpe handbook entitled "Constructions and Use of B & S Automatic Screw Machines." Also tabulated is the number of revolutions required at each spindle speed to feed stock or to index the turret. These data are also interpolated in terms of hundredths of cam surface for each feed change gear setting.

The various cutting, indexing and stock feeding times are determined and from them the number of spindle revolutions determined. These are all added together to obtain the total revolutions to complete one cycle. With this value, the table is consulted for the particular machine being used and the setup determined which corresponds most nearly to the computed number of revolutions on the line which in turn corresponds most closely to the computed operating time. Unless these values correspond exactly, there will be a void or an overlap on the cam surface. These values must be adjusted and in order to assure that the proper feeds and speeds are being used a recheck calculation is necessary. This may result in a further readjustment requiring a further check so that by the process of successive approximations the correct cam design is finally arrived at.

Because of the length of time involved in the above procedure, most cam designers utilize short cuts and guesswork in making the above adjustments, but often do not check the resulting final feeds in order to determine the operating characteristics of the cam. This often results in unsatisfactory performance of the machine and is frequently blamed upon tool design and other factors not directly at fault.

In order to eliminate computations as much as possible, to keep the basic data for the cam design in terms of feeds and speeds, to simplify as far as possible the process of successive approximations in arriving at the proper cam design and to facilitate adjustment of the cam lobes so as to close the periphery of the cam without void or overlap, the author devised the cam design and change gear setup charts for the Nos. 2G, 0G and 00G Brown & Sharpe automatics (see Figs. 31, 33 and 34). These charts are designed to furnish data for cams to be used on these machines within those ranges of feeds included within the limits provided, within which the feed drive gears *A* and *B* have a 2:1 ratio. Additional charts will be required for setups outside of the above limits.

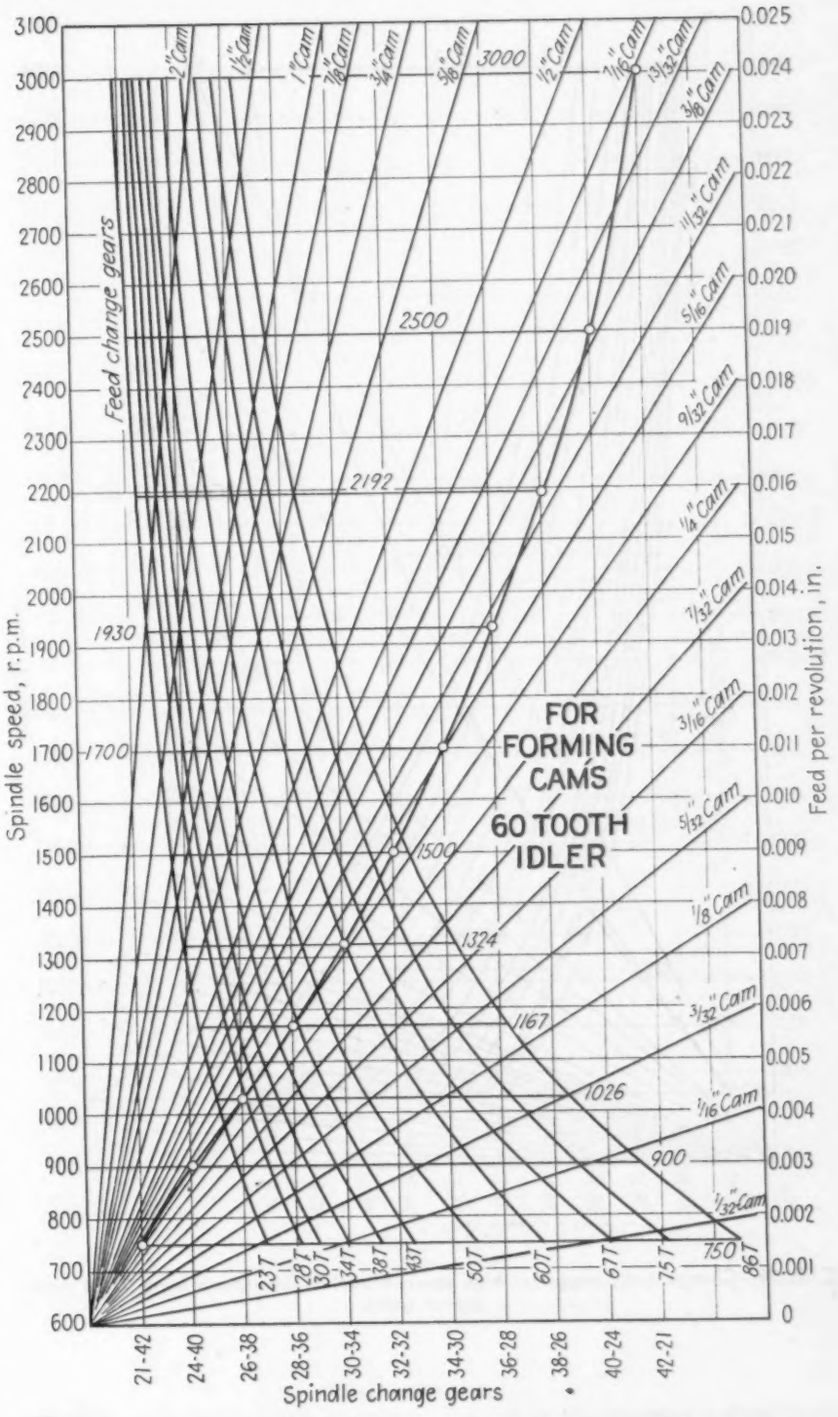


FIG. 28—Change gear setups for high speed Model B Davenports using 60 tooth idler.

Use of Charts

The charts are used as follows: The chart is entered along the left margin at the desired spindle speed and the horizontal line followed to its intersection with the spindle speed curve, marked by circled dots. Three of these curves are provided; one for the large pulley, one for the intermediate pulley and one for the small

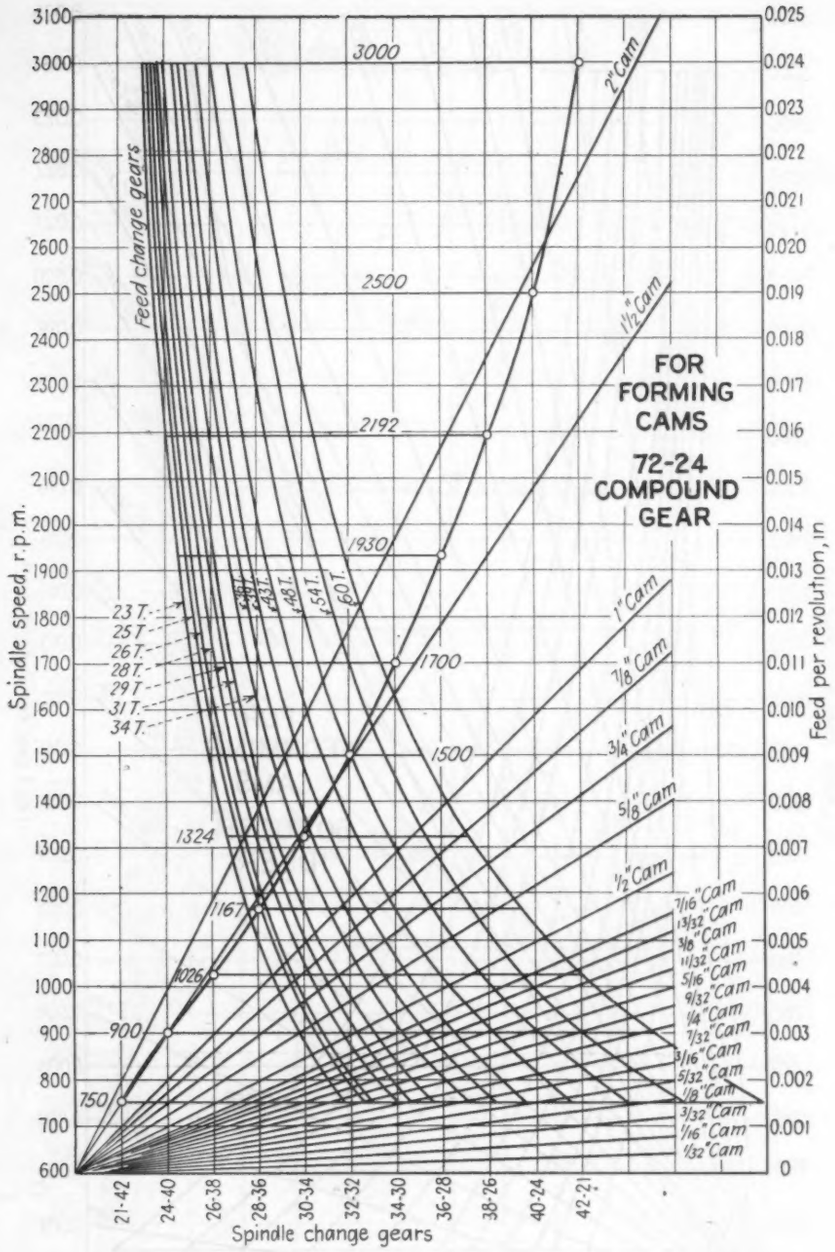


FIG. 29—Change gear setups for high speed Model B Davenports using 72-24 compound gears.

pulley, giving respectively high, intermediate and low spindle speeds. Whether any of these is reversed does not affect the utility of the charts. The encircled dots on these curves correspond with the possible spindle speeds on the machines. The corresponding change gears can be found at the bottom of the chart.

The scale at the right of the chart serves a dual purpose: It gives the feed values and is also used to indicate the rise of the cam lobes per hundredth of cam surface. This latter scale is carried across the top of the charts conforming to the curves indicating cam rise which radiate from the origin at the lower left. The feed gear curves cross these in diagonal curves.

After assuming the desired feed, the chart is entered at this value along the right-hand margin and the horizontal line followed to its intersection with the ray corresponding to the desired rise per hundredth of cam surface. From this intersection the vertical line is followed to its intersection with the spindle speed line corresponding to that being used on the machine. The nearest feed gear curve is then selected and the corresponding change gears are the ones to be installed in the machine. Reference should be made to the sketch in the upper right-hand corner of the chart for proper location of change gears.

After the change gear curve has been selected, its point of intersection with the spindle speed line is then found and the vertical line followed to its intersection with the rise of cam ray and the actual feed determined from the horizontal line passing through this intersection. This same vertical line is used to determine feeds or cam rises for all the other lobes and adjustments made in terms of feed or cam rise between the various lobes along this line. This can all be done by visual analysis without the need for computations. Should difficulty be encountered due to the need for excessive feeds in order to accomplish the proper closing of the cam, proper adjustment may require a change in feed change gears. This can be quickly accomplished on the chart by shifting along the spindle speed line to the next gear curve and a new analysis is made of the feeds and cam rises along the vertical line through this intersection. By reversing the process, the feeds and cam rises can be quickly determined for any setup already installed on a machine. An example will clarify the use of these charts.

Problem Worked Out For No. 2G B & S Chart

Consider the problem illustrated in Fig. 32 which is taken from Example 1 on p. 130 in the Brown & Sharpe manual on "Automatic Screw Machines," 1942 edition. The completion of this part will require four operations: Advance to stop, turn, form and cut-off. Since the turning operation will require the removal of 3/16 in. of stock it should be divided into two operations, roughing and finishing. Advancing to stop should not require more than 5/100 of the cam surface, while the cut-off is quite deep and should cover approximately one-third of the cam surface, overlapping some of the other operations. The cut-off cannot overlap the turning operations because of tool interference but it can readily overlap the forming operation. Since the cut-off will of necessity require approximately one-third of the cam surface, the turning operations will have to be confined to the remaining two-thirds or 67/100, less the 5/100 for the stock advance. This leaves 62/100 in which

to obtain the necessary turning operations. However, this spread must include turret indexing and necessary clearance for withdrawals between operations. It may be assumed for approximation that 10/100 will be required for these purposes. This leaves 52/100 for the two turning operations themselves, or 26/100 each.

If the part is analyzed it will be apparent that the length of cut is 1½ in., and with a ⅛ in. roughing cut and 1/16 in. finishing cut, a longitudinal feed of 0.010 in. should be satisfactory. If the length of cut is divided by the number of hundredths of cam surface available for each operation the rise in thousandths of an inch per hundredth of cam surface is determined, thus:

$$\frac{1.500}{26} = 0.058 \text{ in. per hundredth}$$

Since this part is assumed to be made of brass, the maximum speed of the machine will be used. Therefore the chart for the No. 2G high speed B & S screw machine, Fig. 31, will be entered at 3000 r.p.m. and the spindle curve intersected. The chart indicates (lower left) that the 36/14 tooth combination of change gears will be required for the spindle gears. The chart is then entered along the ray representing 0.058 in. rise per hundredth of cam surface and the ray traced to its intersection with the 0.010 in. feed line, entered horizontally from the right. The vertical line through this intersection is then traced up to its intersection with the 3000 r.p.m. line. This point is about half way between the 80/32-40/80 and the 80/32-42/77 feed change gear curves.

Lower Spindle Speed

If some other spindle speed had been selected, such as 2080 r.p.m. for a larger diameter part, but the rest of the data had remained the same, the intersection of the 0.006 in. feed line with the 0.058 in. ray would be followed up until it intersected the 2080 r.p.m. line. From this point the sweep of the change gear curves would be followed up and to the left to the top of the chart, in this instance indicating a set of ratios somewhere between 60/60-72/84 and 60/60-80/80. The initial choice of 3000 r.p.m. did not bring this use of the curves out inasmuch as the 3000 r.p.m. line is the top boundary of the chart.

Since the relationship between feed and rise per hundredth has been approximated it would be inadvisable to spread the cam coverage for these operations. If an adjustment is necessary it should tend towards reduction in the spread for the turning operations. Therefore the 80/32-40/80 gear curve is adapted.

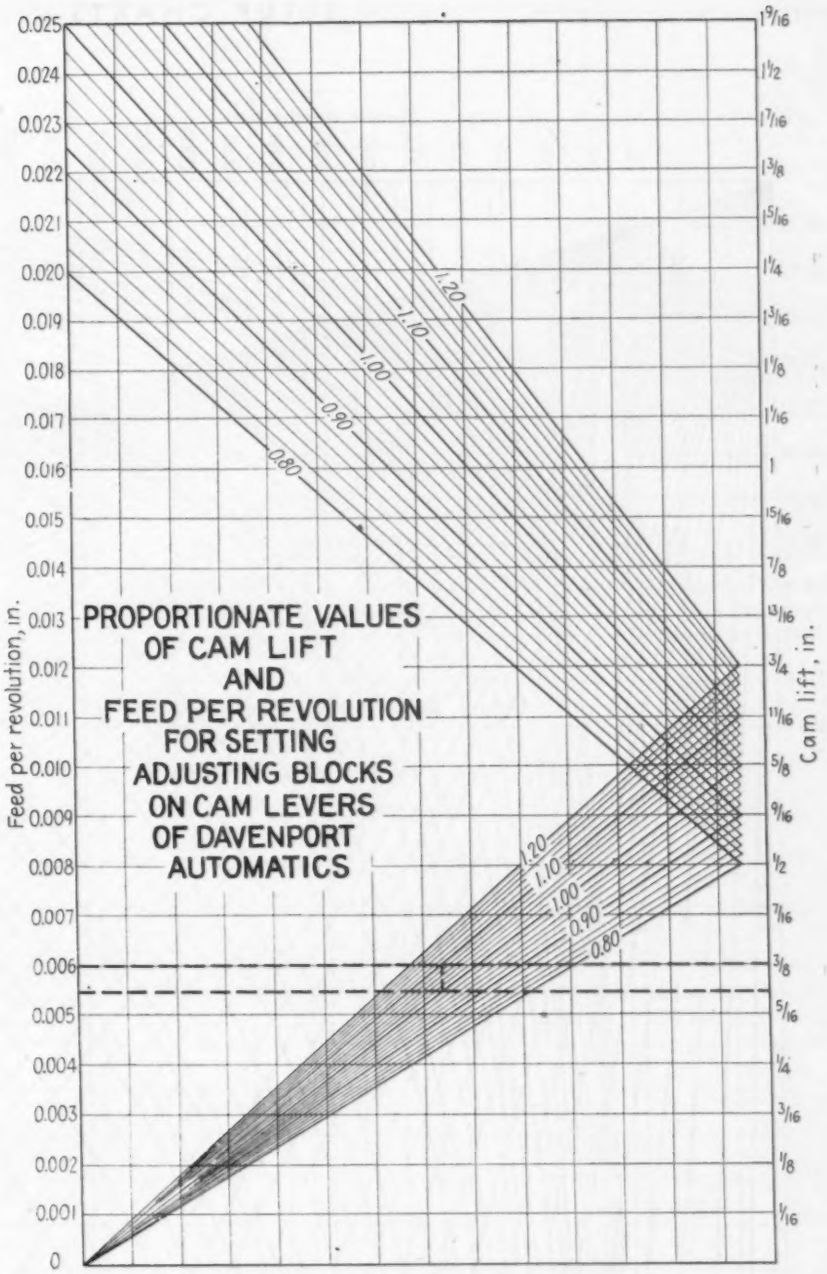


FIG. 30—Proportionate values of cam lift and feed per revolution for setting adjusting blocks on cam levers of Davenport automatics.

Rechecking Adjusted Values

The trace is now shifted along the 3000 r.p.m. line to the 80/32-40/80 feed gear curve which is slightly to the left of the original position, and the vertical line through this new intersection traced down to its intersection with the 0.010 in. feed line. The ray through this intersection proves to be the 0.060 in. rise per hundredth curve. The number of hundredths required is now to be checked by dividing the length of cut by the rise per hundredth:

$$\frac{1.500}{0.060} = 25/100$$

This is the same as is used in the example in the Brown & Sharpe handbook (Example 1, p. 130). It will be required for each turning operation.

In a similar manner, by tracing the same vertical line as has already been determined which passes through the intersection of the 3000 r.p.m. line and the 80/32-40/80 feed gear curve, the data for the other operations can be determined. The feed rates will have to be approximated and for the

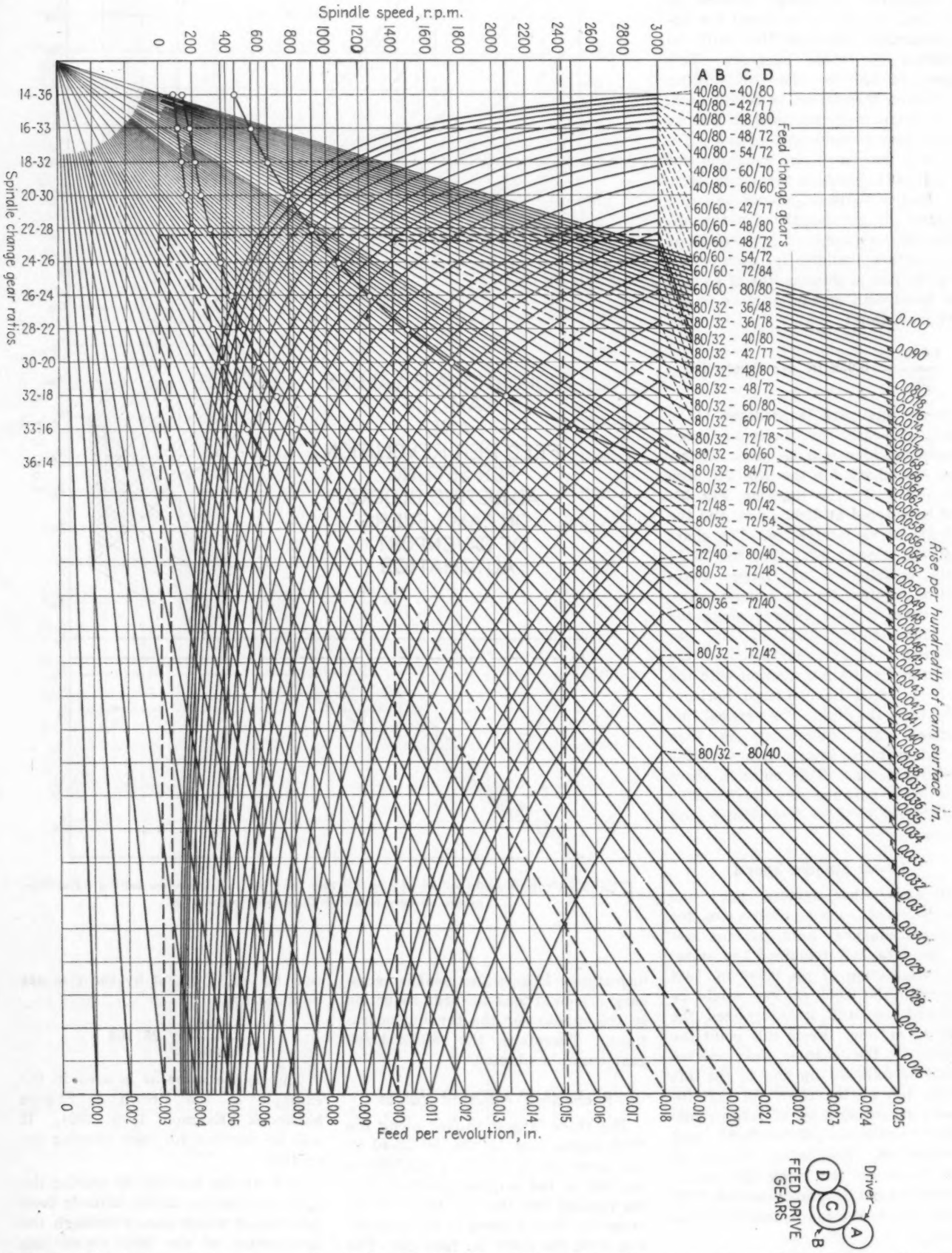
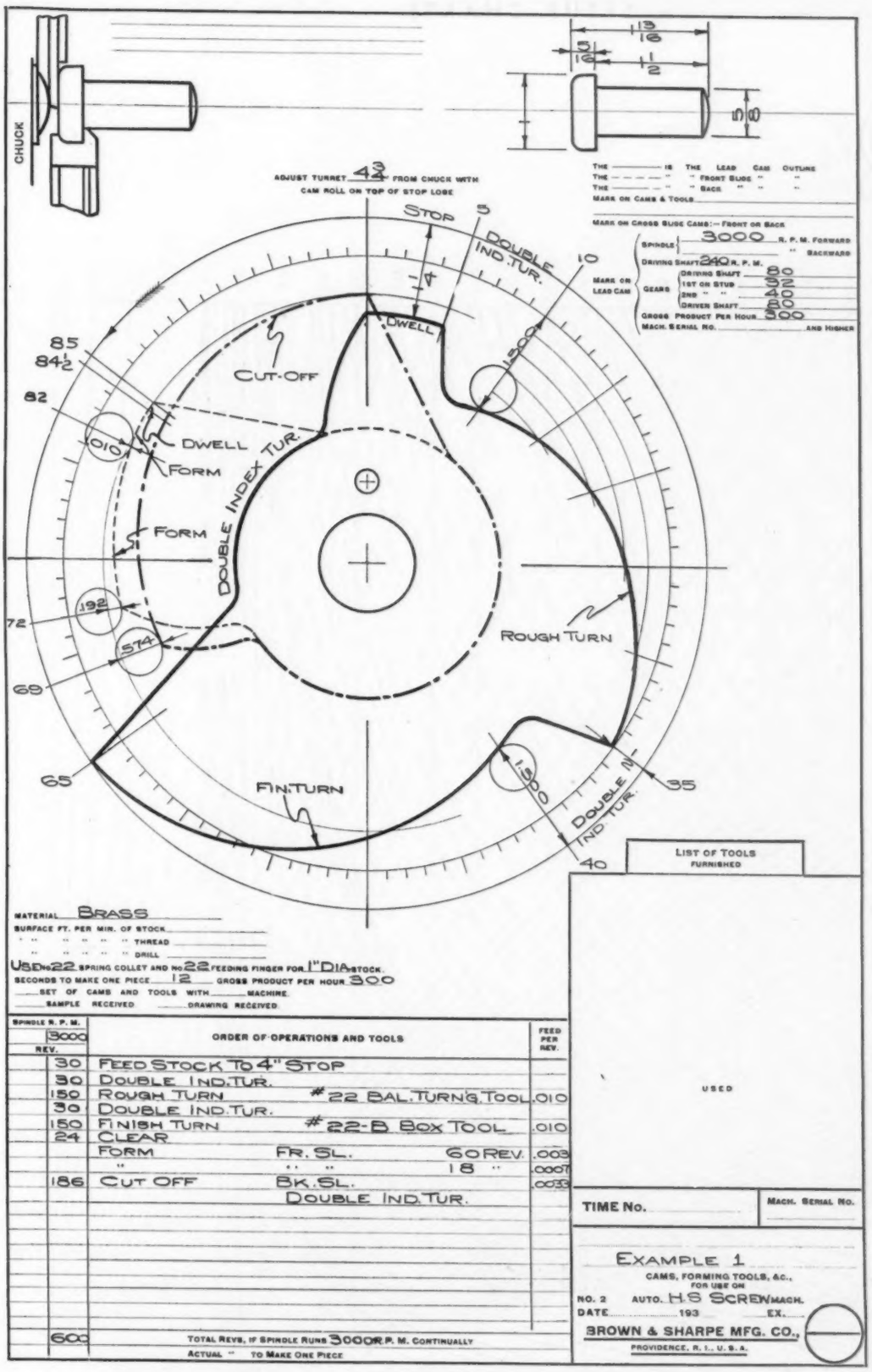


FIG. 31—Cam design and change gear setup chart for No. 2G Brown & Sharpe automatic screw machines with 36 spindle speeds, starting with Serial No. 7352.


CHUCK
ADJUST TURRET 4 3/4 FROM CHUCK WITH CAM ROLL ON TOP OF STOP LOBE
STOP
DOUBLE IND. TUR.
DWELL
CUT-OFF
DWELL
FORM
FORM
DOUBLE INDEX TUR.
ROUGH TURN
FIN. TURN
DOUBLE IND. TUR.
MARK ON CAMS & TOOLS
MARK ON CROSS SLIDE CAMS:— FRONT OR BACK
SPINDLE 3000 R. P. M. FORWARD
DRIVING SHAFT 240 R. P. M.
MARK ON LEAD CAM
GEARS
DRIVING SHAFT 80
1ST ON STUD 32
2ND " " 40
DRIVEN SHAFT 80
GROSS PRODUCT PER HOUR 300
MACH. SERIAL NO. AND HIGHER
MATERIAL BRASS
SURFACE FT. PER MIN. OF STOCK
" " " " THREAD
" " " " DRILL
USED No 22 SPRING COLLET AND No 22 FEEDING FINGER FOR 1" DIA STOCK.
SECONDS TO MAKE ONE PIECE 12 GROSS PRODUCT PER HOUR 300
SET OF CAMS AND TOOLS WITH MACHINE.
SAMPLE RECEIVED DRAWING RECEIVED.
LIST OF TOOLS FURNISHED
USED
TIME No.
MACH. SERIAL NO.
EXAMPLE 1
CAMS, FORMING TOOLS, &c., FOR USE ON
NO. 2 AUTO. H.S SCREW MACH.
DATE 193 EX.
BROWN & SHARPE MFG. CO.,
PROVIDENCE, R. I., U. S. A.
TOTAL REVS. IF SPINDLE RUNS 3000 R. P. M. CONTINUALLY
ACTUAL " TO MAKE ONE PIECE

SPINDLE R. P. M. 3000 REV.	ORDER OF OPERATIONS AND TOOLS			FEED PER REV.
30	FEED STOCK TO 4" STOP			
30	DOUBLE IND. TUR.			
150	ROUGH TURN	#22 BAL. TURNG. TOOL		.010
30	DOUBLE IND. TUR.			
150	FINISH TURN	#22-B BOX TOOL		.010
24	CLEAR			
	FORM	FR. SL.	60 REV.	.003
	"	" "	18 "	.0007
186	CUT OFF	BK. SL.		.0033
		DOUBLE IND. TUR.		
600				

FIG. 32—Cam design sheet for example worked out on the setup chart for the No. 2G Brown & Sharpe high speed automatic.

examples that follow have been selected from the recommended feeds given on p. 248 of the B & S handbook already referred to. The data corresponds also to the figures worked out in Example 1 of the handbook for the No. 2-G machine.

For the forming operation (0.003 in. feed), if the 80/32-40/80 feed gear line is traced down to the 0.003 in. feed line, the intersecting ray indicates a cam rise to 0.018 in. per hundredth. Since the total depth of cut is 0.187 (3/16) in. plus 0.005 in. approach and less 0.010 in. for finish, the amount of cam surface required will be:

$$\frac{0.187 + 0.005\text{-}0.010}{0.018}$$

$$= 10.1/100$$

For the finish forming feed of 0.0007 in. per rev., the rise will be 0.004 in. per hundredth. This represents:

$$\frac{0.010}{0.004} = 2.5/100$$

For cut-off, a 0.0033 in. feed is to be used. Therefore the intersecting ray of the chart indicates 0.020 in. per hundreths. Since the depth of cut is 0.500 in. plus approach and overlap, let it be assumed that the tool movement will be approximately 0.574 in This represents:

$$\frac{0.574}{0.020} = 28/100$$

Thus all of the principal elements required for the design of the cams, as well as change gear data for the setup of the machine, has been determined in a matter of minutes. Only two tables in the manual have to be referred to in completing the design. These are the tables giving data on the number of hundredths required to feed stock and to index the turret. All other data has been determined graphically with the minimum of computations.

Charts for B & S Nos. OG and OOG automatics are presented on the following pages.

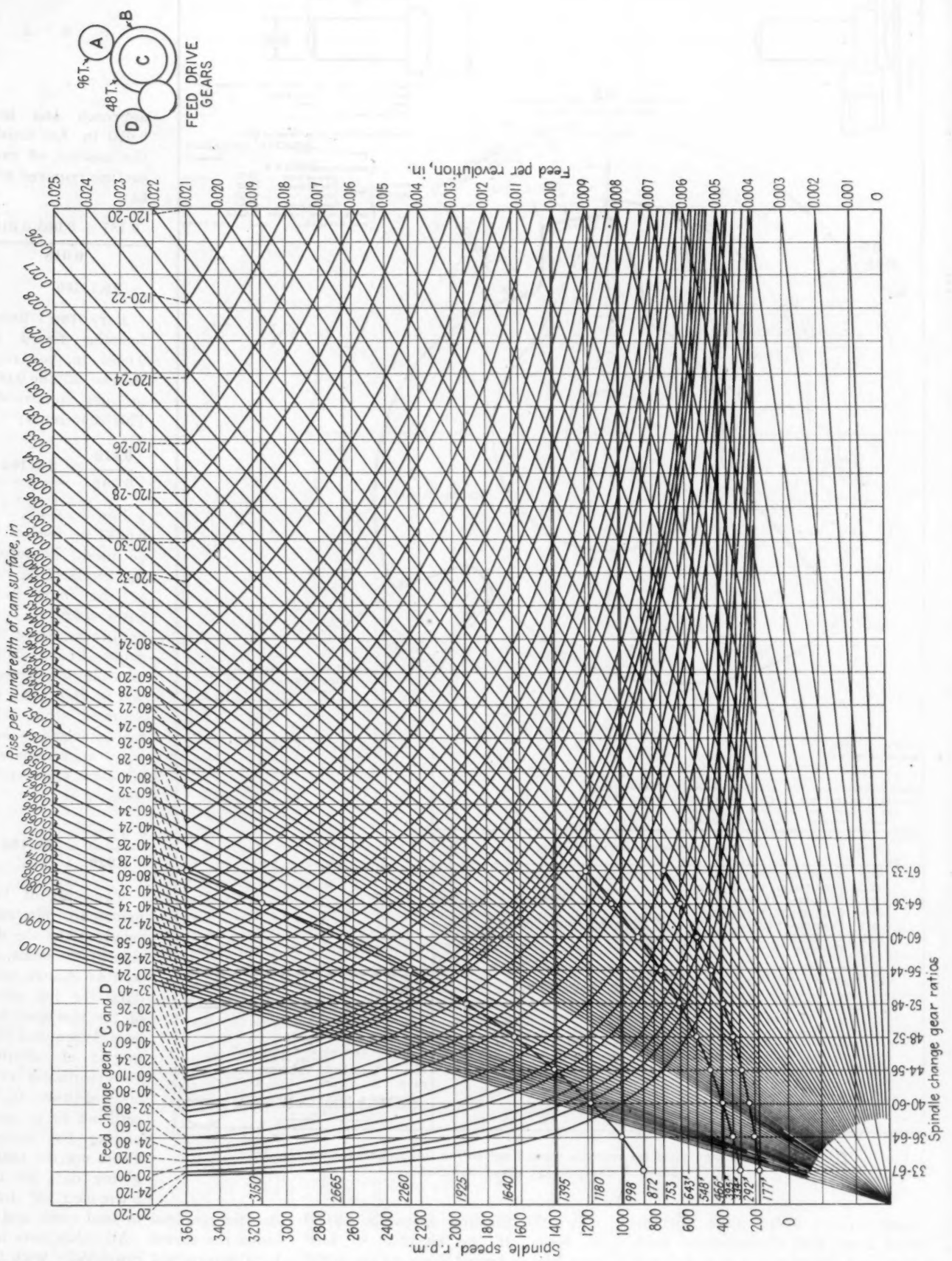


FIG. 33—Cam design and change gear setup chart for No. 0G Brown & Sharpe automatic screw machines with 30 spindle speeds, Serial Nos. 7676 to 8020.

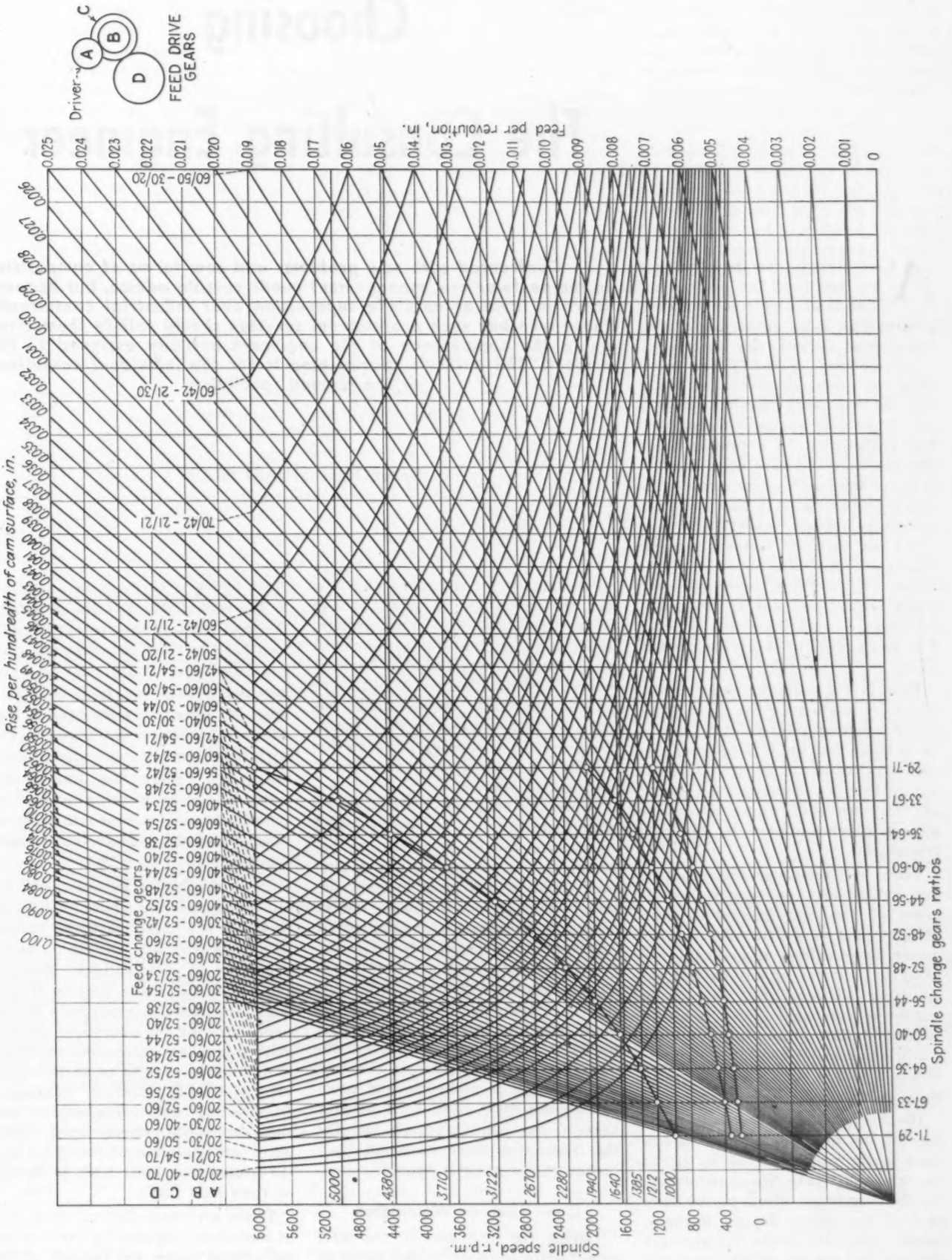


FIG. 34—Cam design and change gear setup chart for No. 00G Brown & Sharpe automatic screw machines with 36 spindle speeds, starting with Serial No. 12852.

Choosing
The Consulting Engineer

. . . Confronted with new problems and new forms of competition in the postwar era, management needs outside advice, but because there is little or no state supervision over industrial consultants, those who buy such professional services should satisfy themselves as to the competence of the engineers actually assigned to the project. The author's special plea is for the individual consultant or the teamed specialists.

o o o

By GEORGE STUART BRADY
Washington

o o o

AT no time in the industrial era has the need for professional industrial engineering been greater than today in the face of a revamping of industry for postwar civilian economy. So many new materials and processes have come out of the last five years that no company can afford to be content to meet postwar competition on a prewar basis. But not since the days when the "efficiency engineer" craze struck the country after the last war has there been more outside "expert" advice offered the harassed factory manager than there is today, for some of the larger of the firms, with big sales staffs, contact as many as 500 manufacturers a week, and mail solicitation has grown to enormous proportions.

How is the manufacturing executive to choose among the many engineering services offered him? How is he to know that the firm offering him such services is competent? Unfortunately, this is one question he cannot ask his own staff whose operations will be psychoanalyzed by the men brought in.

Those who remember the record of the independent management engineers of the last generation, who brought their very title, efficiency engineer, to an epithet of contempt, are likely to fight shy of any outside engineering advisers. But this is no answer to the matter, for it is not to be denied that there exists a real sound engineering consulting profession and that it serves a most useful place in industry.

The executive gets the daily opinions of his own engineers who are close to the problems, but he is the one who must take the consequences for the long-range effects on the business of changes in design, methods, layout, controls, production-payment systems and a score of other matters that mean expenditures which should show eventual profits. He needs occasionally to have these matters reviewed by someone not tied directly to the details of operations and who has the advantage of broad outside competitive experience. Furthermore, when large expenditures are involved in projected changes, the banking houses and the boards of directors have always liked an additional impartial outside viewpoint. Then again, there are the temporary problems for which the engineering department may not be staffed.

When the final V-day comes, many manufacturers are going to find themselves caught in a squeeze between the public expectation of lowered prices and a possible labor demand for increased basic hourly wages to balance the cutting off of war overtime pay that will reduce the weekly take-home pay of the workers. To meet even the threat of such a situation, every effort will have to be made to reduce unit costs by improvements in design, materials and methods. But on top of this is the fact that changes in materials and processes since 1939 have been greater than in any similar period, and for the most part these have not been broadcast for security reasons.

Can't Lean on Washington

During the first part of the war, manufacturers found it easy to go to Washington for advice on their conversion problems. There they found thousands of industrialists and engineers who had come into the government agencies to give their services to the war effort. But the exodus of the most alert and competent of these men back to their own businesses began soon after D-day, and less and less dependence can now be placed upon Washington as a source of free advice. Furthermore, the freedom with which business men shared their knowledge during the war period when all were working against a common enemy, is bound to be more restricted in the after-the-war normal competition.

There is thus a general need for outside engineering advice. But by no means is it a mere matter of calling in anyone who sets himself up as an expert or as a consultant. Even in the states that have laws to license engineers, there is practically no supervision over the operations of consulting management engineers. There is nothing to prevent promoters with attractive advertising campaigns from selling engineering services and then depending entirely upon scheduling into the plant of the client any the states that have laws to license on their paid staffs.

There are three distinct categories of consultant engineering services being offered today, but because of the total lack of public control such as exists in law, medicine or accounting, the buyer of the services is on his own in making a choice. First, there

is a large number of individual engineers of broad general experience who offer themselves as consultants. They may, or may not, have assistants, but they invariably offer their personal services, and the buyer can thus judge exactly whom he is bringing in for the work. It is then merely a matter of choosing among the individuals as to the competence for the particular work. None of these men are super-human, nor are they miracle workers, but the best of them do not take on jobs that do not fit in with their experience.

Group Partnership

The second type is the group partnership, generally made up of the same type of engineer as the lone operator, but grouped to handle a wider variety of work and for general pooling of facilities and knowledge. Among these groups the buyer of the services is usually brought into direct contact with the individual engineer who will operate in the plant, and the decision is made on the same basis. Among individual consulting engineers, and those engineers of competence who are grouped for joint action, professional ethics are in general quite high, advertising is modest, and if salesmen are employed they are merely contact men, and the deal is closed with the engineer. In few cases do these firms use the device of "preliminary surveys" to gain entry into a factory.

It is often asked why bad engineering jobs are not reported to the licensing bureaus of the states, or to the better business bureaus of the Chambers of Commerce. The answer is one of psychology. Since the sales of engineering services are usually made to the highest officials of a company, often over the heads of the regular engineering staffs, a normal human reaction in the case of a mistake is for the top management to avoid anything that might indicate to the employees that it had been "stung."

Mass Production Type

In the third category is the mass production type of engineering service with large sales staffs and salaried engineers. The procedure is to charge from $8 to $12 per hr. for each engineer placed in the factory. These engineers are normally paid a maximum of $2 per hr. on the "billable hours," with time and a half for all hours per week above 40. Billable hours are not necessarily spent in the client's plant, but also includes all time outside or in the hotel room which the engineer may spend on the problems. It is thus usual for the engineer to turn in 60 or 70 billable hours a week.

The proportion of bona-fide professional engineers on this type of work is not large. It is not to be expected that high-grade professional engineers of any considerable experience would be found willing to be scheduled about the country away from home almost continuously, and work 60 hr. a week for a small salary. For the most part, the types of men willing to follow these schedules are young men of adventurous nature, or those taking the work as an opportunity to gain experience and "look around" for a permanent, settled job. Occasionally, exceptionally competent older engineers are found, but they do not follow the work for long, and not infrequently, if they do a good job they are offered permanent positions with the companies for whom they have done the work.

The supervising engineers who follow the work of a number of engineers in a given district are theoretically of a higher type, but the same problems are involved. However, many of the poor jobs done are not because of incompetence of the engineers, but rather because of the almost impossibility of keeping the jobs so timed that the staff engineers can be picked for work for which they are suited. Naturally, if an engineer experienced only in press work is scheduled into a factory to work in a screw machine department, he must stumble along and acquire the experience at the expense of the client.

Skill Cannot Be Delegated

The principle on which the true professional engineer operates is that expert professional services cannot be delegated to paid workers. There is the story in the life of the metalworker Cellini, that the King of France hired him to do a number of jobs for the royal palace. He brought with him from Italy only two assistants. King Francis, coming one day to Cellini's workshop, found him engaged with chisel and mallet. The king admonished him for doing the work personally. He said that he wanted many jobs done, and that all the workers of France would be placed at the metalworker's disposal for the asking. But Cellini answered that he had been hired as a professional artist, and that if the king wanted his genius in the work all the workers of France would serve him no purpose.

In almost every country in the world except the United States professional engineers must pass fitting examinations and be licensed before they can offer their services for hire. In America there is supervision over law, accounting, architecture, medicine and over public construction engineering where human life may be endangered by failure. But men who are hired as engineers in factories need not be licensed and likewise those management engineers who offer their services to industry for surveys and reports on factory conditions are not supervised by the states.

No Legal Responsibility

An engineer who signs a drawing for a bridge or a building has a legal responsibility if there is a failure, but a management engineer offers nothing for which a court could hold him. His contention would be that he is merely offering general suggestions to the management, and has no responsibility for operation. On cost control matters, the engineer merely offers the system and is not responsible for the figures as is the accountant. In industrial engineering, therefore, the manufacturer must depend entirely upon his own ability to choose the engineer to give him the service for which he is paying. Moreover, he has practically no recourse to avoid paying for the work regardless of its quality, as the contract covers work, not quality, and it is practically impossible to prove defective quality in a suggestive report. The engineer can always say that the manufacturer did not put on the right kind of men or carry out the suggestions properly.

The so-called preliminary surveys that are offered by engineering salesmen free or at a relatively small set fee are not indicative of what the engineering services may be. Anyone who has ever put a penny in a weighing machine and received his "fortune" printed on a card, knows how readily a "survey" can be made to fit any case. These surveys follow standard patterns. The executive may have been told scores of times of factory faults by his own staff, but the psychology of the survey is that he will be astounded by the ability of the outside engineer to pick them out and will thus sign the contract.

Disappearing Experts

Mark Spade, noted English economist, once said that an expert is never a permanent employee. He is a

(CONTINUED ON PAGE 139)

Drawing and Ironing ½ In. Magnesium Plate

. . . By heating the magnesium plate to a temperature between 500 and 600 deg. F., it has been found possible to successfully form a domed cup with 52½ per cent reduction in one draw from a ½ in. plate. Wall thickness was then reduced 37 per cent by an ironing operation. A complete analysis of all the factors involved is given by the author.

o o o

By J. WALTER GULLIKSEN, M.E.
Worcester Pressed Steel Co., Worcester, Mass.

o o o

DEEP drawing of magnesium sheet has come into considerable prominence during the period of war production and recent developments at the Worcester Pressed Steel Co. have proven that this technique may be extended to ½ in. thick magnesium plate as well.

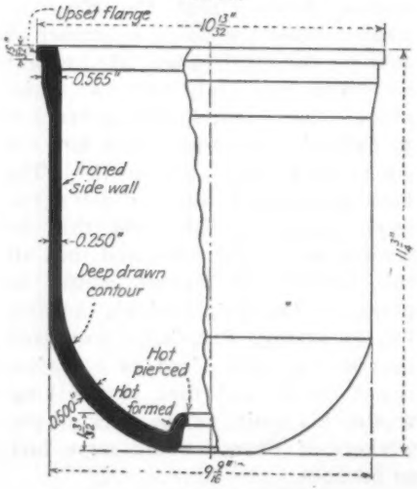
Generally speaking, magnesium sheet and plate are not very plastic at room temperature. If a strip of the metal is placed in a vise and bent sharply at 90 deg. it will snap off at the bend. The theoretical explanation for this brittleness lies in the inherent nature of the crystal structure which is hexagonal close-packed and at room temperature only the horizontal slip planes are active. The metal therefore work-hardens rapidly. At elevated temperatures, additional slip planes become active and when the proper fabricating methods are used magnesium is found to equal or excel most metals in plastic formability.

This increase in plasticity is so great that tensile tests at 650 deg. F. have shown elongations of well over 100 per cent on sheet having only approximately 15 per cent elongation at 70 deg. F. The significance of this change is further emphasized by the fact that deep drawn cups with a reduction of 60 per cent from blank to cup can be produced at 650 deg. F. in a single double action press operation whereas at 70 deg. F. reductions of 15 to 20 per cent would be the maximum possible.

Hot deep drawing of magnesium sheet has largely centered around light and medium gages and the majority of the parts thus produced have required only one or two press operations.

o o o

FIG. 1 — Principal features of magnesium housing and operations involved.



To investigate the field further, the Worcester Pressed Steel Co. recently produced a pilot run of propeller domes using ½ in. thick magnesium plate and requiring a whole series of press operations, including "ironing" the side wall, indenting and upsetting, as well as deep drawing. Aluminum (61S-T) domes have been produced at this plant for the past five years and are used to house the feathering mechanism of the Hamilton Standard propeller. It has therefore been possible to accumulate some interesting comparative data on these two light metals.

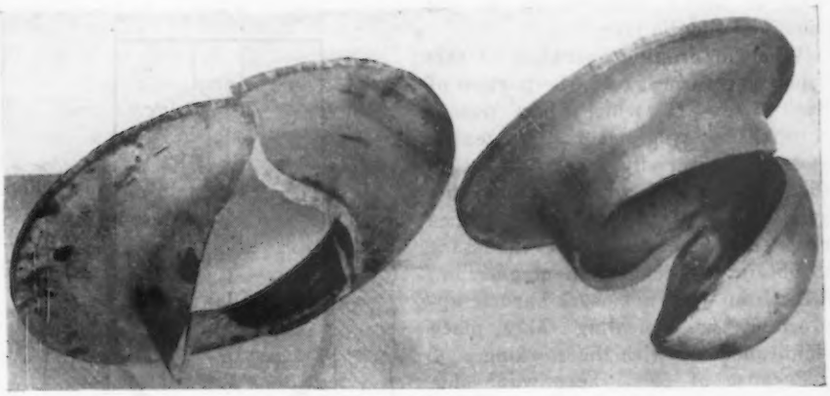
The major dimensions of the housing are shown in Fig. 1. It will be noted that the wall gage varies from 0.250 to 0.565 in. The outside contour is stepped out to a flange at the open end and the domed head contains a sharply depressed portion. As far as could be ascertained, magnesium of the heavy gage required had not been drawn to this extent and side wall ironing operations of the type involved had not been attempted.

It was therefore felt that the production of a magnesium housing by press operations was a development calculated to tax both the formability of the metal and the skill of the craftsman to the utmost.

Magnesium alloy per Army-Navy-Aeronautical Specification AN-M-29 was selected for this work. This alloy, which is commercially designated AM-C52S by the American Magnesium Corp. and Dowmetal Fs-1 by the Dow Chemical Co., has the following composition:

Element	Per Cent
Aluminum	3
Zinc	1
Manganese	0.2
Magnesium and normal impurities—balance.	

Blanks 19¼ in. diameter were cut from plate 0.500 plus 0.040 minus



ABOVE
FIG. 3—Ruptured magnesium plate due to insufficient temperature for the draw.

LEFT
FIG. 2—Blank and first cup.

0.000 in. thick. The first operation was performed in a double action press and produced a cup 9.150 in. inside diameter by approximately 10¼ in. long—a reduction in diameter of 52½ per cent. Fig. 2 shows a blank and the cup produced in this operation.

In fabricating the standard 61S aluminum dome, two operations are required to produce a cup this size. The first press operation produces a cup 10-15/16 in. inside diameter from the 19¼ in. diameter blank—a reduction of 43 per cent. This cup is then redrawn to 9.150 in. inside diameter —a further reduction of 16 per cent. The single hot drawing operation on magnesium therefore replaces two cold drawing operations on aluminum.

The hot drawing operation was performed in a 300-ton hydraulic double action press. The tools were heated by means of gas ring burners while the blanks were preheated in an electric furnace and handled with tongs.

Gas Heated Die

The burners were located in such a way as to heat the die and the pressure ring only. In an operation of this type, it is best not to heat the punch, since by the time the drawing operation has progressed to the point where the magnesium makes intimate contact with any considerable area of the punch, the deformation of that portion of the metal is complete. The slight cooling effect of the punch then becomes advantageous, tending to increase the tensile strength of the magnesium somewhat and lessening the possibility of rupture as the drawing operation proceeds to completion.

Operating temperatures of 500 to 600 deg. F. were found necessary for successful results. When the temperature was allowed to drop below this range the effect was immediately apparent. At 450 deg. lateral breaks appeared in the sidewall and there was considerable checking in the domed end. When the temperature was permitted to drop to around 375 deg. the operation failed entirely as the punch broke through the head before a complete cup could be formed.

Fig. 3 shows two parts which ruptured during the initial double action draw due to insufficient temperature. One failure is at the line where the hemispherical end becomes tangent to the side wall. The resistance to the draw was so great that the tensile strength of the metal was exceeded. The other failure occurred at a still lower temperature. In this case the punch split the somewhat brittle metal before any appreciable drawing occurred.

The cups produced by this hot double action draw had a wall thickness throughout the sides and bottom substantially uniform and equal to the ½ in. thickness of the original blank. In order to produce the 0.250 in. wall as shown in Fig. 1, ironing operations were required, such as are employed in cartridge case work.

Ironing Operation

The first set of ironing tools was designed to reduce the sidewall to 0.333 in. thickness for a distance of approximately 4½ in.—a reduction of 37 per cent. Fig. 4 shows the arrangement of the working parts of the tools. The punch forces the cup through a die ring having a diameter less than that of the cup. The metal in the side wall is squeezed between the punch and the die ring and as the operation proceeds the wall gage is reduced or ironed from 0.525 in. to 0.333 in. The displaced metal manifests itself in an increase in length. In the case under discussion it was desired to maintain a thick wall at the open end. Therefore the parts were forced part way through the ironing ring and then ejected. This produced a shoulder on the outside wall of the parts as shown in Fig. 5.

It is interesting to analyze this operation further with particular regard to the major stresses involved. Note that the pressure of the punch against the hemispherical end of the cup pulls the cup through the die ring which compresses the metal passing through it. It is apparent from Fig. 4 that the 0.333 in. side wall is in tension and the 0.525 in.

• • • For other data on the drawing of magnesium alloys the reader is referred to the following articles which have appeared in THE IRON AGE: "Hot Forming of Magnesium Alloy Sheets," by E. P. Resos, Consolidated Vultee Aircraft Corp., July 27, 1944, p. 42; "Deep Drawing and Forming of Magnesium Sheet," by Arthur E. Meyer, Meyer Sheet Metal Machinery Co., Nov. 30, 1944, p. 44; and "Deep Drawing Magnesium Alloy Sheets" by L. J. Weber and H. Vanden Berg, Aluminum Cooking Utensil Co., May 10, 1945, p. 70.

wall is under compression at the mouth of the die ring.

When an ironing operation of this type is performed cold, the portion of the sidewall which has passed through the ring has had its tensile strength materially increased due to the severe cold working and this greatly favors the operation. Since elevated temperatures are necessary to obtain plastic flow in magnesium, the metal does not work-harden appreciably as annealing takes place simultaneously with the working.

Because of this, there was some doubt as to the ability of magnesium to stand such ironing operations. However by maintaining temperatures just high enough to obtain the necessary plasticity, the ironing was successfully completed. It is probable that the favorable ratio between the compressive and tensile srengths of magnesium facilitated the ironing operation and that the relatively cool punch assisted matters also.

The 0.333 in. side wall was ironed to 0.250 in. by means of a subsequent operation of the same type.

The next series of operations produced the indentation in the rounded end. The depth of the depression and the sharpness of the corner radii made this forming more difficult than might be expected at first glance.

A hole 5/8 in. diameter was pierced in the center of the head to allow some of the metal to flow from the center to form the indentation. This piercing was performed hot to avoid shear cracks in the hole which might open up in the following operations.

By using large corner radii in the first hot indenting operation, metal

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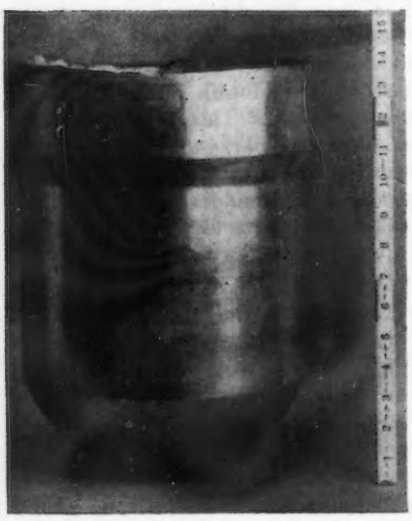
FIG. 5—Magnesium housing after ironing sidewall but before upsetting flange.



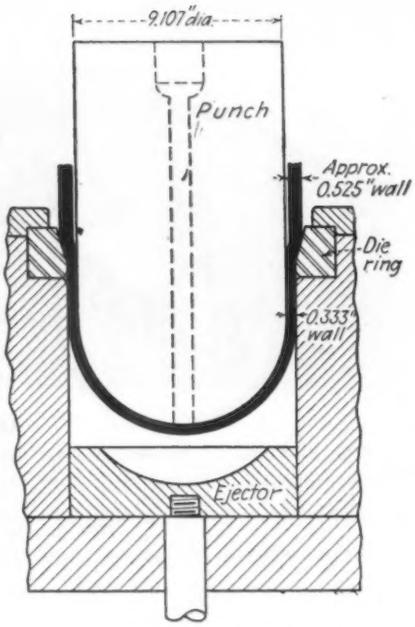


FIG. 4—Reducing side wall 37 per cent by ironing.

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was drawn into the depressed portion. Subsequent hot pressing operations formed the contour to the exact dimensions required. Some stretching and coining took place during this work. In some respects the forming of this indentation was the severest part of the job but magnesium amply demonstrated its plasticity at the elevated temperatures used.

Upsetting Operation

The operations described thus far were concerned with deep drawing, ironing the side wall and forming the depressed portion in the hemispherical end. A different type of metal working was involved in producing the 10-13/32 in. o.d. rim at the open end of the part. The wall gage at this rim is heavier than the original blank and an upsetting operation was used to produce this thickening. This operation exerted a compressive stress on the side wall, meanwhile confining the part in a die in such a way as to permit metal flow at the rim only.

Prior to this upsetting, the domes were trimmed in a turning operation which faced off the open end, leaving the length slightly greater than the desired finished length to provide the necessary metal for the rim.

The last hot press operation consisted of striking the entire dome in a closed die. This not only upset the metal at the edge to form the rim but also sized all the important dimensions producing a completed housing as shown in Fig. 6.

During the initial double action press operation it was found that successful results depended on holding the proper operating temperature. This experience was borne out on subsequent operations. Best results were obtained in the range from 500 to 600 deg. F.

Graphite Lubricant

At these temperatures, lubrication becomes somewhat of a problem. Ordinary drawing lubricants are not suitable. Graphite provides adequate lubrication but introduces a troublesome cleaning problem. A mixture of colloidal graphite and mineral spirits sprayed on the blanks before heating have good results. Acheson dispersion No. 2404 was found convenient to use and quite satisfactory. Colloidal graphite mixed with Cyltal (E. F. Houghton & Co.) also gave fairly good results when swabbed on the tools.

The residual graphite coating left by these lubricants was found to be very difficult to remove from the finished parts. Carbon is essentially insoluble and when it becomes firmly imbedded from repeated hot press operations the problem of cleaning is multiplied.

A number of cleaning methods were tried out. A solution of 1 lb. of citric acid powder per gal. of water loosened the graphite by attacking the base metal. Fairly brisk rubbing was necessary. This procedure produced a pleasing silvery clean surface.

Hot chromic acid was found fairly effective but the obnoxious fumes made the use of this cleaner rather objectionable.

A solution of 4 oz. of calcium ni-

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FIG. 6—Final product, a propeller nose housing press formed from 1/2 in. magnesium plate.

trate per gal. of 15 per cent chromic acid proved to be a good cleaning bath. Immersion of the parts in such a solution for 5 min. at room temperature followed by a rinse in water produced clean parts without scrubbing.

Subsequent treatment of the surface to inhibit corrosion will not be discussed here as any of the standard treatments would be applicable.

The physical properties of the completed magnesium dome were checked by test on four tensile specimens cut from various parts of the side wall. The average results of these tests are shown in the following table together with typical properties and specified minimum values for annealed sheet in the same alloy:

	Specimens from Wall of Dome	Annealed Sheet Minimum	Annealed Sheet Typical
Yield strength, lb./sq. in.	19,000	.....	22,000
Ultimate tensile, lb./sq. in.	38,000	32,000	38,000
Elongation in 2 in., per cent	19	12	18
Brinnell hardness	57	.....	54

It can readily be seen from these figures that the extensive and varied press working of the metal with repeated heating to temperatures of 500 deg. F. to 600 deg. F. did not adversely affect the properties. On the other hand there was no appreciable increase in properties such as is typical of cold drawn stampings.

Allowance for Shrinkage

Since the press operations were performed at elevated temperatures it was necessary to take into account the expansion of the hot tools and the shrinkage of the parts upon cooling. The thermal coefficient of expansion of magnesium is more than twice as great as that of steel. Therefore the net result of the two opposed thermal effects was that the parts produced were slightly smaller than the dies. Check measurements showed a net shrinkage of 0.030 in. on the outside diameter with other dimensions proportionate.

The fact that elevated temperatures are required for deep drawing magnesium plate tends to increase costs and complicate fabricating technique with regard to lubrication, cleaning and shrinkage allowances. On the other hand there are several factors which tend to offset these disadvantages. Large reductions are possible in a single draw, sometimes eliminating an operation as previously described. Furthermore intermediate cleaning and annealing are unnecessary and troublesome springback is avoided. The net result of these opposing influences is to make the deep drawing of magnesium plate an entirely practical manufacturing procedure with considerable commercial possibilities.

Besides its lightness and high strength-weight ratio, magnesium has good fatigue endurance and excellent machinability. The development of fabricating technique as herein outlined in the production of domes from magnesium plate by deep drawing and allied hot pressing operations should help to extend the use of this metal to new fields of application.

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"Insulating" Welding Gloves

NOVEL safety device at Graham-Paige Motors Corp., Detroit, is this handy mitt dryer designed to protect employees when arc welding Alligator amphibian tanks. Perspiration, with its high salt content, is a good conductor of electricity and increases the danger of serious shock to workers handling electrical equipment. To eliminate the hazard, welding gloves are now rapidly dried by slipping them over narrow chimneys protruding from a metal cabinet which contains a heater and fan. Six pairs at a time receive the hot-air treatment.

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Jet Quench Minimizes Aluminum Distortion

PRODUCTION of aluminum alloy parts for C-48 Commandos at the Curtiss-Wright, St. Louis plant, is being materially aided by new, high-speed aluminum heat-treating equipment. With this equipment, a work load of 1200 lb. of aluminum alloy, together with its 900 lb. truck, can be heated from 70 to 930 deg. F. within 25 min.

The equipment consists of a General Electric furnace with throttling reactor controls, loading station and a quench chamber especially designed by Curtiss-Wright (foreground, Fig. 1). Unusual features of this installation include an automatic water spray quench which minimizes quenching distortion, and a push-button controlled load truck which not only provides a centralized operating position but eliminates the human variable in the quenching operation. In addition, a precision temperature control is incorporated in the equipment which, with other advantages, prevents over-

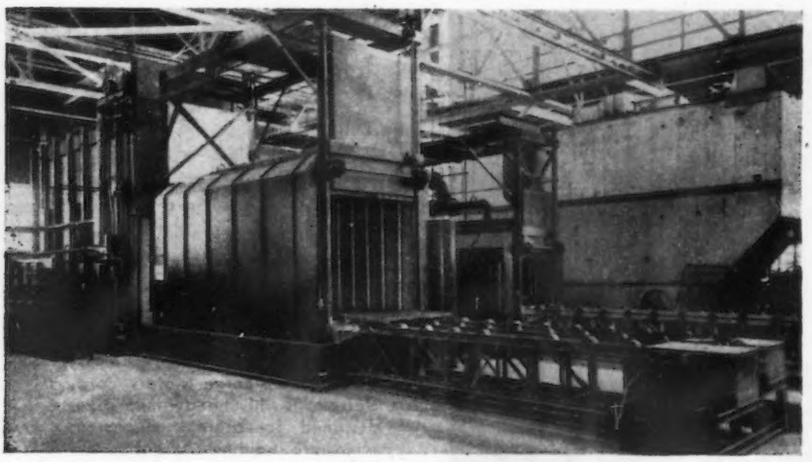


FIG. 1—Roller hearth electric furnace and allied equipment for heat treating of aluminum alloy sheets in plant of Curtiss-Wright Corp., St. Louis. Load truck fabricated of heat-resisting alloy, measuring 14 x 15 ft. is shown being rolled from quench chamber. The electric controls are at the extreme left. Over all length of this installation is 58 ft.; the furnace proper is 21 ft. long and 19½ ft. in height at its highest point.

shooting as the temperature reaches the control point.

The jet quench consists of 300 nozzles, Fig. 2, through which pass approximately 2000 gal. of water at each quench. The spray lasts for 30 sec. and a pump returns the water to the supply tank after each operation. Whenever the water reaches 100 deg. F. after quenching, it is drained off and replaced with cool water.

A push-button station located near the front of the furnace controls the conveyor. With the truck loaded and ready for heat treating, the operator pushes the "Load to Furnace" button. The furnace door is then hoisted until it hits a limit switch. Simultaneously, the conveyor motor is started and the truck is moved through the quench hood (these doors are open except when quenching) and then into the furnace until the truck hits a limit switch. The motor then stops, the door of the furnace closes and the load is "soaked" at heat treating temperature for the required length of time. The lift type door is tightly sealed in the closed position by an air-operated clamping mechanism. A two-speed motor hoist provides a slow-down stop at the end of the door travel, easing the shock of the stopping. Succeeding operations are initiated by pressing the "Furnace to Quench" and the "Quench to Unload" buttons, while a button marked "Furnace to Unload" permits the load to be moved from the furnace directly to the unloading position. A fifth button, painted red and much larger than the others, is for emergency stop purposes. A selector switch permits independent, operation of each push button.

The main power for the heating units is brought through three controlling or "throttling" reactors to the furnace. The effect of the reactors in the circuit is varied by Reactrol power panels. These, in turn, are governed by temperature controllers which independently derive their information from chromel-alumel thermocouples located in the top of the furnace near the fans which recirculate about 50,000 cu. ft. of air per min.

A continuous power flow type of control is used, because the fast heating cycle requires a high rate of heat transfer early in the cycle, at the same time preventing overshooting as the temperature reaches the control point and during the soaking period. This continuous throttling control is much easier on the power system than the on-off type, since there is never an actual interruption of the circuit.

The saturable core reactors, consisting of a laminated iron core with three windings, acts as a valve to regulate the amount of electric power flowing to the furnace. Two a.c. windings are connected in series with the furnace and the main power supply, while one d. c. winding is connected to the Reactrol panel. With no current in the d. c. winding, the impedance of the a. c. windings is high and most of the power-supply voltage appears across the reactor. Hence, the power input to the furnace is at a minimum. The reverse is true when maximum current flows in the d. c. winding. Intermediate values of power input are obtained by varying the current in the d. c. winding.

RIGHT

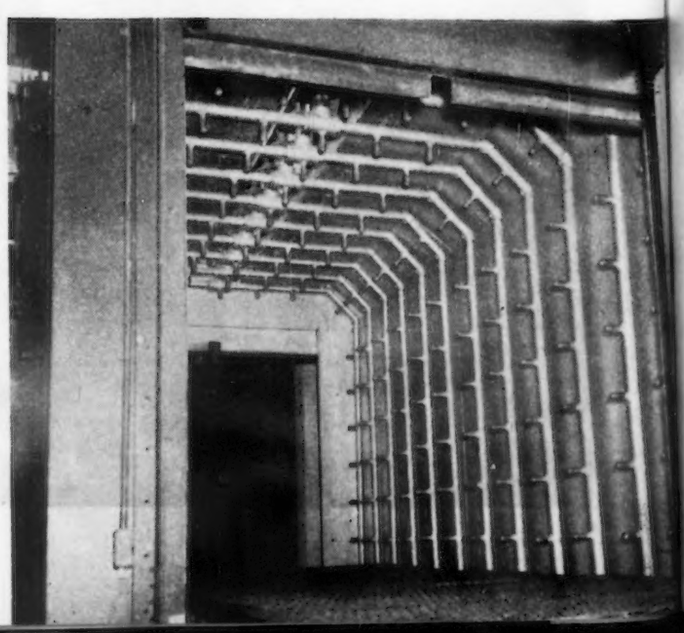
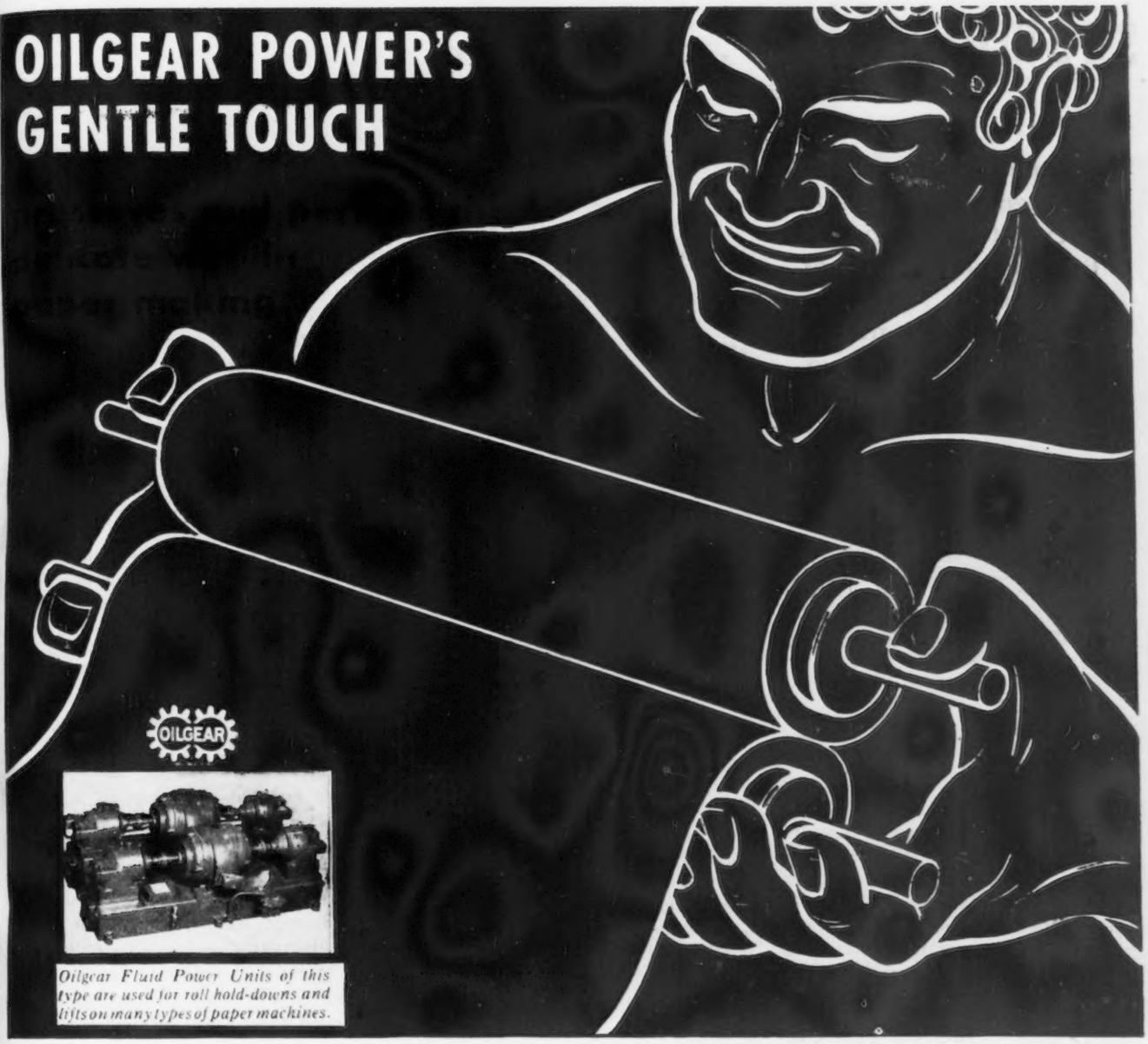


FIG. 2 — Close-up showing some of the 300 nozzles attache to a series of co-axial pipe loops in the je quench chamber used with roller hearth ele.-tric furnace.

OILGEAR POWER'S GENTLE TOUCH



Oilgear Fluid Power Units of this type are used for roll hold-downs and lifts on many types of paper machines.

Short fine "hairs" of cellulose actually floating in water are what paper is made of. Matted together in a moist, fragile web they are passed through successive rollers. Each set of rollers squeezes more water out until finally the substance is recognizable as paper.

But what precision of controlled and irresistible power is needed in the opposing rollers . . . not only to preserve the fragile web hundreds of feet long but to insure uniform moisture extraction and unvarying calibration of thickness.

Here, and on other types of paper machines and printing presses, Oilgear Fluid Power hold-downs and lifts maintain that important squeeze indefinitely at any degree of exquisite fineness. There's independent pressure adjustment for each end of roller from a convenient panel. There's power to lift and hold up the rolls. Yes, the positive action, the steady preset pressure, the utter controllability of force, smooth gliding acceleration and deceleration make Oilgear Fluid Power the ideal solution to straight line and rotary power transmission problems. You should know what Oilgear can do for you; you should not wait. . . . Write THE OILGEAR COMPANY, 1303 W. Bruce Street, Milwaukee 4, Wisconsin.

ARE YOU TRYING TO:

1. Apply large forces through long . . . or short . . . strokes at variable speeds?
2. Obtain automatic work cycles, variable speeds in either direction . . . with or without preset time dwell?
3. Apply large forces through continuous or intermittent reciprocating cycles at constant or variable velocities?
4. Obtain extremely accurate control of either position or speed of a reciprocating member?
5. Apply accurately variable pressure either static or in motion?
6. Closely synchronize various motions, operations or functions?
7. Apply light . . . or heavy . . . forces at extremely high velocities through either long or short distances of travel?
8. Obtain continuous automatic reversing drives at constant R.P.M. or over a wide range of speed variation?
9. Obtain accurate remote control of speed and direction of rotation, rates of acceleration and/or deceleration?
10. Obtain constant horsepower output through all or part of a speed range?
11. Obtain automatic torque control?
12. Obtain accurately matched speed of various rotating elements?
13. Obtain constant speed output from a variable speed input?
14. Obtain full preset automatic control, elimination of problems of shock, vibration, etc.?

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• Bumpers of low alloy high tensile steel are expected to find wider field of uses in postwar automobiles . . . Massive protection bars will take more steel per car than spring leaf types.

DETROIT—While the tendency of the past 20 years has been to reduce the weight of automobiles, thereby reducing steel tonnage per unit, one car part—bumpers—began an increase in size in 1940 which is likely to reach a point where prewar tonnage figures may have doubled a year or so after new car production is resumed. Furthermore, the tendency seems to be in the direction of using quality low alloy high strength steels, rather than the spring steel which was in general use until a year or so before the war.

The reason for this shift by many producers is that the bumper has become more massive with the years, more a rigid push bar than a spring leaf. The increased size is characterized not only by extensions curving around the fenders, but also by greater vertical section. The swing away from spring steel, usually SAE 1085 specification, is developing out of the fact that forming into comparatively involved design and plating imposes production difficulties and expense which in part justify the use of a more ductile and more expensive steel.

The Oldsmobile Div. of General Motors pioneered the use of massive bumpers in its 1940 models. The trend caught on rapidly and most makers except those in the lower price fields were using really larger and more intricate bumpers when the war halted production. Indications are that the postwar period will see this vogue continued and amplified in all but the lowest price fields.

Those Oldsmobile cars produced six years ago this coming fall, starting the trend, carried bumpers made of N-A-X high tensile steel produced by Great Lakes Steel Corp., in Detroit. By reason of that start, Great Lakes is in the lead position today in automobile bumper applications for low alloy high tensile steels, but at the same time it is meeting increased competition in postwar model figuring from practically all other mills producing similar steel.

METAL being specified for the large bumper applications is furnished in cold rolled sheets of 0.090 to 0.130 in. gage. The work is cold stamped in medium heavy presses, light buffed and plated. The product possesses reasonably high strength combined with a degree of hardness sufficient to withstand a normal amount of denting from contact with other objects or road stones. The material is sufficiently ductile to bend rather than snap under most impacts; it can be hammered back into shape; and it can be welded where necessary.

Spring steel used for bumper stock does have the advantage of greater hardness, of course, and in applications where its function continues to be that of a spring leaf it probably is still the best material to be used. Customary manufacturing procedure is to hot form, harden, grind, polish and plate. But where the design is as intricate as it was on many of the prewar cars the work may distort on cooling after the hot forming and has a tendency to pit, necessitating grinding and occasional hand finishing before satisfactory plating can be applied.

A pair of spring leaf type bumpers as produced before the war weighed somewhere around 40 lb. per car. Some of the bumper designs being developed for postwar use weigh up to nearly 100 lb. per car, and a good going minimum seems to be 60 lb. A five million car year, therefore, could require a maximum of about 250,000 tons of steel for bumpers if all were of the massive type, against a prewar level of 100,000 tons or so.

Low alloy high tensile steels cost from 50 to 100 pct more than orthodox spring steel, but proponents of the former material maintain this cost differential is all but eliminated in the reduced number of operation steps, together with the elimination of much hand work. Beyond that, of course, they stress that their nomina-

WATER MAIN: *Rangoon civilians aiding British and Indian engineers, place a section of the new pipeline into position as they tackle the vast problem of laying a pipeline from the city's Gyobyu Reservoir in reconstructing the damaged water system.*

TWO WAYS TO RELIEVE *Reconversion Headaches*

1 Call in P&W Engineers

Their long years of experience in solving tooling problems can be of invaluable help to you in smoothing the way as your reconversion plans begin to take concrete form. Although all war needs must be given first consideration in every case, you will find that the helping hand of P&W engineers can make the inevitable change-over easier, quicker, smoother. They are ready at any time to work with you. Call on them — now.

2 Make Full Use of P&W Literature

Pratt & Whitney's many catalogs and other literature on the long list of precision machine tools, small tools, and gages are full of helpful ideas and facts which have broken many a production bottleneck. Here, you may discover new uses for the equipment you have — or find that the addition of certain machines or tools will solve a particular problem with ease. We will be happy to send you any of our literature you may request.

NOTE: For your convenience, we are once again able to renew our policy of maintaining stocks of all standard tools and gages at our branch offices.

PRATT & WHITNEY

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tion is definitely necessary from the processing standpoint.

As supplied, low alloy high strength bumper stock, specially processed for highest hardness and necessary ductility, has tensile strength around 80,000 lb per sq in, increased by cold working to around 100,000 lb per sq in., hardness running to about 240 brinell. This compares with tensile strength around 150,000 lb per sq in. on SAE 1985 steel, heat treated for bumper use to about 300 Bhn.

THE better physical qualities of low alloy high tensile in comparison to the low carbon grades, on the other hand, together with its ductility and formability presage the possibility that it will find additional uses for itself in the automotive field, as in others. At Great Lakes, one of the pioneers of the development, seven years of testing have convinced company metallurgists that the material has definitely proved itself able to respond to cold forming into difficult shapes which often could not satisfactorily be stamped out of low carbon deep drawing stock. In other cases, ordinarily carbon steel of the 1010-1020 variety has provided the necessary physicals but has not been successfully formed without considerable modification of dies, added operations, or intermediate annealing.

The attribute of cold forming raises another interesting prospect in the automotive field. Hitherto bumper manufacturing was almost exclusively the province of spring makers. If, however, cold forming is to come to prominence as a means of producing bumpers, any well-equipped press shop will be able to take on such work if it provides plating facilities. Obviously this could presage considerably increased competition for the rather small group of bumper specialists in the industry, and it may lead to more bumper manufacture by the automobile makers themselves than has been the case in the past. In this connection, it is understood that at least one automobile maker which formerly bought from outside sources intends to cold form its own bumpers in the postwar period.

OPA Meets with Auto Parts Group in Move To Fix Car Prices

Washington

• • • **In a preliminary move** toward effective price control of automobiles to be made in 1945, OPA held a meeting recently with the Automotive Parts Industry Advisory Committee, the prices of whose products will be a fundamental factor, as will prices of strip and sheet steel, in setting ceilings on new passenger cars.

It is expected that OPA will stick to its announced objective of returning the prices of auto parts to a base charged for parts in the 1941 model cars. Officials of the pricing agency, however, said that they would give consideration to industry requests that pricing for parts be on a company-by-company basis. Industry members said that a considerable increase in costs of parts had taken place during 1941, and that contractural relationships between parts makers and automobile manufacturers were such that these increases were not reflected in prices charged car manufacturers.

For the purpose of getting data upon which prices can be established, a questionnaire was submitted by Kenneth G. Matheson, chief of the Analysis Unit, Machinery Branch in the OPA Price Department.

Increases over the base prices would be permitted companies or industries upon showing, in the questionnaires, of labor and direct material cost increases under the reconversion formula as announced by Price Administrator Chester Bowles.

Chrysler Service Group Leaves for China To Form Repair Network

Detroit

• • • **Led by Col.** Graham B. Trainer, the first group of Chrysler Export Corp. technical and service experts has winged off for China to establish a network of truck repair and supply bases on the "road to Tokyo."

This group will be augmented in China by a continual flow of company personnel that will eventually require about 500 American engineers and mechanics—plus more than 3000 Chinese—to staff the 15 repair shops that will service thousands of cargo trucks hauling war supplies throughout Free China.

Wendell H. Welch, Chrysler executive in charge of Detroit activities on the China service contract, announced that many more men will leave for China within the next few weeks. He said the company is continually hiring qualified technical men and mechanics for this overseas service and that applicants should apply at Export Div. of Chrysler Corp., Detroit.

Before the men are sent overseas they are put through a special course in truck maintenance. This is to familiarize the new men with the many special features of the heavy 3-ton truck designed to run under extreme operating conditions in China. Men hired for work in China also are given a preliminary course in Chinese and are instructed on Chinese customs.

TIME SAVER: ***A Cleveland class cruiser undergoes repairs in an eight-section Navy floating dry dock. These docks have a capacity of 56,000 to 100,000 tons which is more than enough to raise our largest battleship. In many cases ships can be repaired and back to duty in less time than it would take them to return to a major base.***

Which OF THESE TWO TOOLS Will Stay On The Job Longer and Reduce Production Costs?

With this Hampden die, time between polishing stretched from 5 to 42 days. The tool room saved 66 hours of polishing time each month, and had 132 fewer tools to make per month.

This extrusion die worked for 5 days before abrasion caused galling. Every time dies galled a half-hour was lost changing 30 dies in the press, and another half-hour was needed to repolish each die.

How Can a Tool Engineer Get *Protection* Against the Loss From Tools That Do a Half-Way Job?

The surest way is to use the Matched Set Method of selecting the proper tool steel for each job. For this method does more than simplify tool steel selection. It also points the way to better heat treating results, and better performance.

The extrusion die shown here is a good example. It is typical of the hundreds of tooling jobs on which tool engineers and tool makers are getting more output at less cost—the Matched Set Way. By using the Carpenter *Matched Tool Steel Manual* as a guide, they can actually plot tool performance before tools are made. And the 80-page Tool Index and Steel Selector in the Manual quickly points to the best starting place when a new problem hits the tool room.

A note on your company letterhead will start the Matched Tool Steel Manual on its way—free in the U. S. A. So drop us a line and find out how the Matched Set Method can be put to work in your plant. You'll save time, tool steel and money.

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Carpenter MATCHED TOOL STEELS

Washington . . . .

L. W. MOFFETT

• Exact extent of military cutbacks during coming year seen as one of prime requisites for successful reconversion of industry.

WASHINGTON—A true picture of the exact extent of military cutbacks during the coming year is one of the prime requisites for the successful reconversion of American industry. The first adequate information regarding the War Department's future procurement plans was made available to the Congress during the recent discussions of the Army appropriations for the fiscal year 1946.

The Congress has approved a $38,500,285,951 supply bill for the current fiscal year. This amount includes $21,376,283,400 in new appropriations, $8,885,501,051 of funds previously appropriated but not obligated and $8,238,501,500 in recoveries from contract cancellations, renegotiation and price redeterminations.

With the initial equipping of American forces completed, the money requested will be devoted to maintaining armies in the field, the replacement of combat losses, and equipping and maintaining other allied armies. For the fiscal year 1946 no further expansion of overall production capacity is contemplated. However, any newly developed weapons may require some limited new construction.

For the fiscal year 1946 only 47.9 pct of the Army obligations are for equipment and supplies and 52.1 pct will go for maintenance and operation. During the preceding fiscal year 63.4 pct of the obligations went for equipment and supplies and only 36.6 pct was used for maintenance and operation. Thus, for the first time during the war procurement comprises less than half of the projected obligations.

The $250,559,706 requested for research and development provides only for development work which can be reasonably expected to be of value during the present war. No long-term research projects are contemplated. Army Air Forces comes in for the lion's share of this sum, taking $148,792,074, while the Ordnance Department coming next will use $50,000,000 for research purposes.

For the fiscal year 1946 funds amounting to $790,641,534 will be available to the War Department for materials to be transferred under lend-lease. This is a reduction of approximately 82 pct as compared with the estimates for 1945. At the end of the fiscal year just closed lend-lease transfers by the Army equaled about $20,000,000,000. The United Kingdom received about 64.5 pct of this amount, Soviet Russia 26.4 pct, China, 2.8 pct and all other nations 6.3 pct.

Emergency civilian needs in the liberated areas during 1946 will require $294,149,000 as compared with $562,556,900 in the fiscal year 1945.

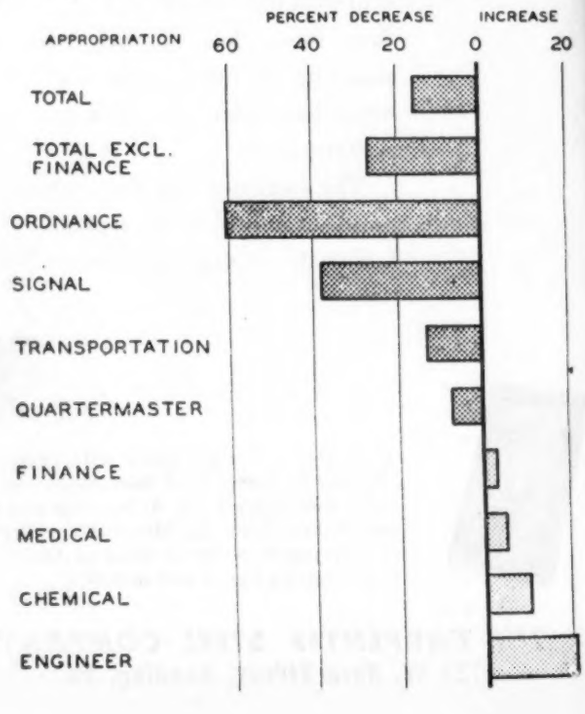
The Army Air Forces have financed the fiscal year 1945 and will finance the current fiscal year from funds appropriated prior to the fiscal year 1945, and at the same time, will transfer a net amount of $7,200,000,000 to other War Department appropriations. This is largely due to cutbacks covering about 45,000 aircraft. Airplane requirements are approximately one-quarter in number and considerably lower in total weight than those in the fiscal year 1945.

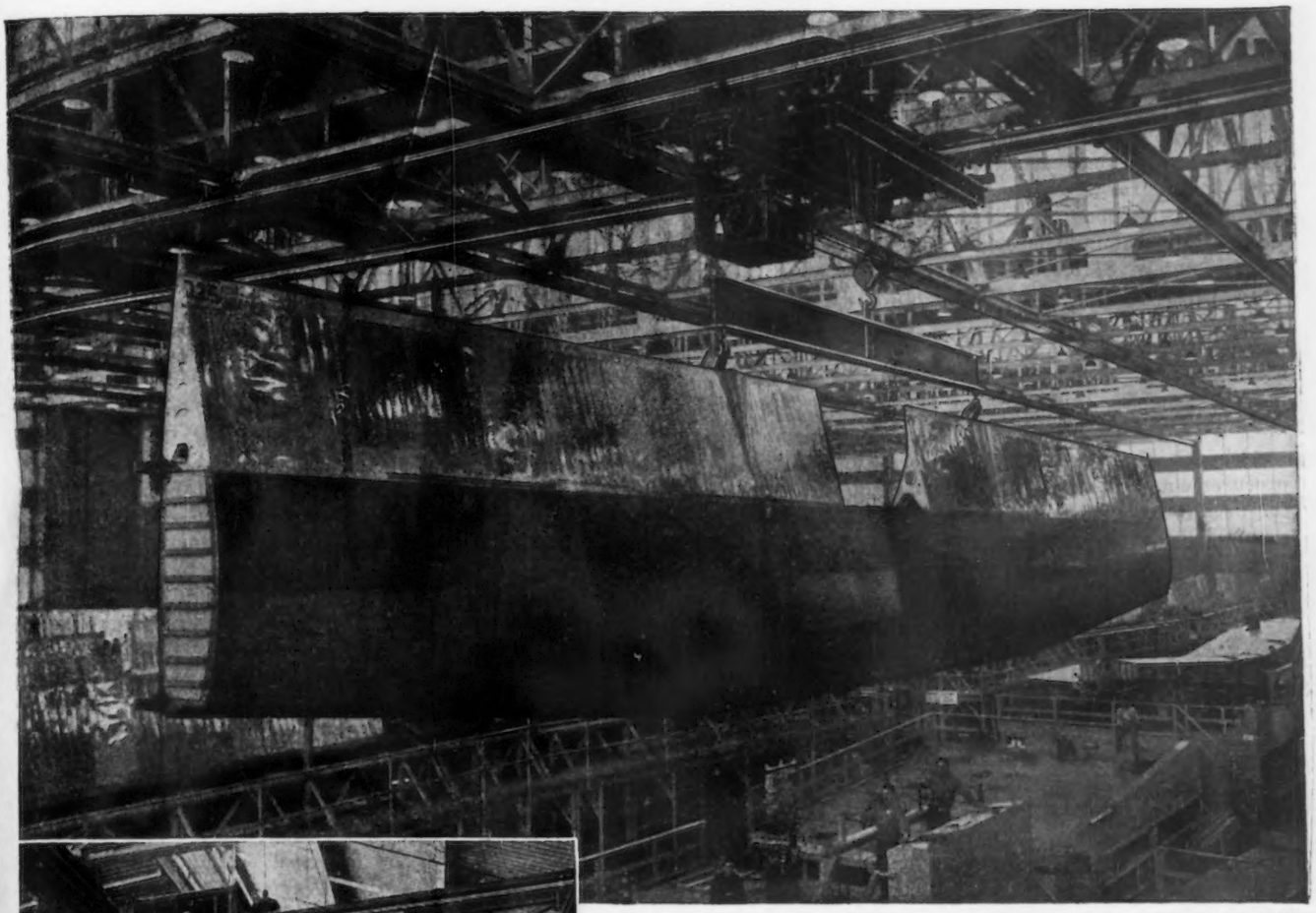
The Army Service Forces estimate for 1946 is 15.4 pct less than that for 1945. The largest cut, about 60.9 pct is in Ordnance items. The Signal Corps cut of 38.2 pct is also substantial. The increase of 10.4 pct in the requirements of the Chemical Warfare Service is accounted for by the greatly increased incendiary bomb program. Procurement of the 4.2 in. chemical mortar will also continue high, since requirements for the war against Japan approximate the total available productive capacity.

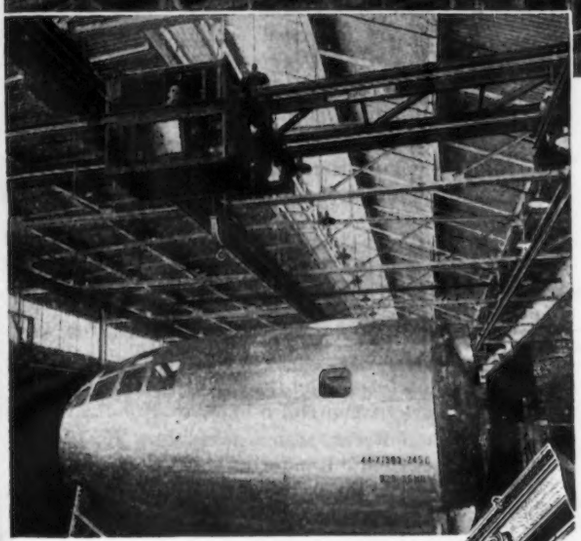
The contributory causes of these cuts, which are especially important in that they will not apply in 1947 should the war with Japan continue, according to Gen. Brehon H. Somervell, Commanding General, ASF, include the following:

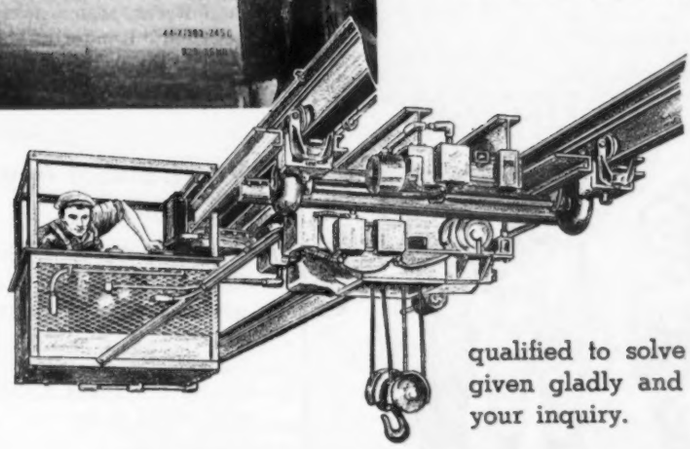
1. Recovery of supplies and equipment from Europe. It is estimated that 70 pct of the equipment now in Europe can be used against the Japs.
2. Accumulation in 1945 of many items originally scheduled for a continuing two-front war.
3. Reduction in stock levels based

Army 1946 Costs Cut Sharply Under 1945









Top
Long-span cranes operate over multiple crane rails and run the entire length of the building.

Bottom
Two short-span cranes inter-locked as a single unit. Carrier can operate each crane individually or both as a single unit.

AMERICAN MONORAIL CRANE

Handles large center section of B-29 Wing

The above photograph shows a six ton center wing section of a B-29 being lifted 25 feet in the air and covering a distance of 85 yards — completely handled by crane cab operator.

This is another example of the overall application of American MonoRail cranes. This long span crane in many respects resembles an overhead railway system, all movement being controlled by the operator in the cab.

Regardless of the weight and type of overhead handling needed, American MonoRail Engineers are qualified to solve your problems. Their services are given gladly and without obligation. We invite your inquiry.

THE AMERICAN MONORAIL COMPANY

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on the lesser requirements for the one-front war.

The Transportation Corps requirements reveal a decrease of $269,100,000. Funds for the procurement of floating equipment, materials-handling equipment, and locomotives are approximately $116,000,000 as compared with $280,000,000 in 1945 and $578,000,000 in 1944. The 1946 requirements include funds for 150 steam locomotives, 1000 flat cars, 1000 box cars and 500 tank cars for lend-lease purposes.

Although the Corps of Engineers procurement will drop 40 pct during the fiscal year 1946 maintenance and repair will increase about 26 pct. This along with slight increases in training and other minor functions will leave the Engineers with approximately a 20 pct increase.

During 1946 the Ordnance Department will spend 88 pct of its appropriation for combat equipment and ammunition. In past years approximately 95 pct of the Ordnance allotment was used for these items.

Lend-lease of Ordnance material in 1946 will amount to $460,700,000 or about 6 pct of the entire program. This is approximately a 65 pct reduction compared with the $1,307,000,000 expended for Ordnance lend-lease material last year.

DIRECT settlement of terminated war contracts on a company-wide basis, provided for in the newly issued joint Army-Navy Termination Regulation No. 2, is expected to greatly speed the closing of such negotiations made complex by many subcontracts.

Under the provisions of the regulation contractors having war contracts with numerous agencies and customers may apply to the Army or Navy for direct settlement of their terminated contracts. The application is reviewed by a joint committee including representatives of the Army, Navy and Office of Contract Settlement. The committee assigns the application to either Army or Navy, which, in turn, reassigns it to a designated office. The assigned contractor deals with one office instead of dealing with many customers, bureaus and services with which he holds contracts.

In order to qualify for direct settlement, the War and Navy Departments pointed out, war contractors should be subcontractors under numerous war contracts, must have sufficient volume of war business to make company-wide settlement economical, must hold contracts which can be settled by one agency in behalf of others and must have an adequate termination organization.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

MY WIFE'S ELECTRIC IRON IS ALWAYS GOIN' ON TH' BUM! WHAT KIND OF A GUY IS THAT NEW ELECTRICIAN? IS HE A GOOD FELLER?
NO, HE'S TERRIBLE! WHY, ONLY A FEW MINUTES AGO A POOR SOUL CAME UP WITH A VACUUM CLEANER ALL APART--AND THAT GUY HAD TH' GALL TO SAY, "I GOT THIRTY JOBS HID AROUND HERE TO DO--AN' I'VE GOT TO DO A LITTLE WORK FER TH' COMPANY!" AN' TH' POOR GUY'S WIFE WITHOUT A VACUUM CLEANER! HE'S AWFUL!
MEATS
7-6
REDRAWN BY REQUEST
J.R. WILLIAMS
HEROES ARE MADE - NOT BORN
T. M. REG. U. S. PAT. OFF. COPR. 1945 BY NEA SERVICE, INC

WPB Restates Contract Cancellation Policy

Washington

• • • **The War Production** Board's policy on cancellation of war contracts has been restated in an amendment to Directive 40 to provide for cancellation as rapidly as possible after victory over Japan, WPB has announced.

Directive 40, which set up the Production Readjustment Committee of WPB, put into effect policies laid down by the Office of War Mobilization and Reconversion for review of proposed procurement cutbacks.

It established procedures for clearance and consultation on cutbacks among representatives of the Armed Forces, Smaller War Plants Corp., Maritime Commission, War Food Administration, Office of War Utilities and several offices within WPB. It also provided for advance planning of Period 1, the phase of the war beginning with final victory in Europe and ending with victory over Japan.

The amended section of Directive 40 states: War contracts will be canceled as rapidly as is mechanically possible after the declaration of V-J Day. Procedures for clearance and consultation on cutbacks will cease to be effective at V J-Day. The procurement agencies will report, by program, to the Production Readjustment Committee those programs which are expected to continue after V J-Day. The reports called for in the above shall be submitted under the terms and limitations of the directive of the Office of War Mobilization and Reconversion dated Jan. 20, 1945, entitled "Report of Changes in Production and Material Requirements to the War Production Board."

W. H. Stubbs Appointed

Washington

• • • **William H. Stubbs** has been designated to succeed Leslie P. Doidge, who has resigned his position as chief of WPB's Consumers Durable Goods Branch, Office of Civilian Requirements. Mr. Stubbs became associated with WPB in October, 1943, as assistant to Mr. Doidge. Previously, Mr. Stubbs had been deputy director of the Property and Procurement Division of the NYA in Washington and was the deputy procurement officer of the Treasury Department in his home town, Birmingham, Ala., between 1935 and 1938.

WHAT IS PLUNGE GRINDING OF THREADS WITH CRUSH DRESSED WHEELS?

What are the advantages of ground threads?

Threads can be ground after stock is hardened, eliminating the ill-effects of distortion or surface decarburization from heat treating—especially desirable in the case of tubes and other thin-walled components. Critical thread elements are accurately produced and held concentric with other ground diameters and threaded sections.

How can threads be ground most quickly?

By plunge grinding with a crush dressed multi-ribbed wheel on the Precision Thread and Form Grinder made by the Sheffield Corporation, Dayton 1, Ohio.

What is plunge grinding of threads?

It is the production of a full threaded section equal to the width of a crush dressed multi-ribbed wheel in one quick operation of less than two revolutions of the work.

To what can plunge grinding be compared?

It takes much less time than required with thread hobbing, is far more accurate, and tooling costs are considerably lower.

Is thread plunge grinding fast?

Definitely yes! The wheel is fed into full depth in ⅓ to ½ revolution of the work, and only one additional revolution is required to complete the threaded part. Sections of threads up to 1¼" in length can be quickly produced by plunge grinding on the standard Sheffield Precision Thread and Form Grinder. Special capacity machines are available for other lengths and sizes.

Does plunge grinding produce threads to an accuracy of class 3 fit?

Unusual uniformity of thread angle, lead and pitch diameter is commercially possible with the Sheffield Precision Thread and Form Grinder especially designed for plunge grinding. Thick first and last threads are eliminated in plunge grinding. On this machine, plunge grinding produces commercial work to not less than a Class 3 Fit accuracy in all cases—and to Class 4 Fit in many.

How can more information be obtained on plunge grinding?

By writing to the Sheffield Corporation, Dayton 1, Ohio.

THE SHEFFIELD CORPORATION • DAYTON 1, OHIO

West Coast .

OSGOOD MURDOCK

• New demand for over 25,000 tons of scrap per month in southern California might firm this market to increase all postwar Pacific Coast steel costs as much as $3.00 per ton.

LOS ANGELES—What tonnage of scrap may be required for West Coast steel and foundry operations immediately postwar? What will likely production be? What will the probable price be when the market is again free and sources of supply and demand are allowed to operate?

Finally, what might be the effect on the southern California market and price if the Fontana mill should continue as a substantial purchaser of outside scrap, particularly should its blast furnace be blown out?

These are vital, fundamental questions in the steel economy of the Far West that have been generally overlooked in the welter of discussion over the postwar far western market for finished steel products and the final disposal and future conduct and conversion of the two principal new war steel plants, at Geneva and Fontana.

In his thoughtful, well-documented article on Kaiser's postwar plans (THE IRON AGE, June 7) C. T. Post reviews prewar exports principally to Japan and suggests that "the price of this scrap, about $17 per ton, represents the absolute maximum paid for West Coast scrap in recent time." He further anticipates "a level closer to $13.50 per gross ton for No. 1 heavy melting grade delivered to consumers as a postwar price applying over the long term."

West Coast scrap men agree that the suggested maximum price for export scrap prewar is too low and that the suggested postwar figure over the long term is much too low.

For the years 1938 to 1940, both inclusive, which may be regarded as a normal healthy operating period, production of and demand for scrap in the seven western states averaged about 1,275,000 tons per year. Of this approximately 40 pct went to the steel mills, 40 pct was exported, 17 pct principally cast scrap, went to the gray iron foundries and only 3 pct supplied the steel foundries. Geographically, aside from exports, approximately 250,000 tons was used in southern California; 350,000 tons in northern California; 120,000 tons in Washington; 15,000 tons in Oregon, and 35,000 tons at all other points. Thus a total of approximately 775,000 tons supplied domestic demand, and the approximately 500,000 tons exported each year for these three years were hard pressed and powerfully pulled surplus.

For the 13 years from 1928 to 1940, both inclusive, an average of 233,000 tons per year was exported from all West Coast ports. Exports from southern California for the same period averaged 80,000 tons per year, 29 pct of the total.

For the three years 1938, 1939 and 1940 an average of 485,000 tons was exported, principally to Japan, from all West Coast ports, and for the same three years the average from southern California was slightly over 180,000 tons, or 27 pct of the Pacific Coast total. From 1929 to 1932 exports averaged less than 50,000 tons a year but starting in 1933 the West Coast exports of scrap were as follows:

1933, 142,000 net tons; 1934, 281,000 net tons; 1935, 326,000 net tons; 1936, 248,000 net tons; 1937, 379,000 net tons; 1938, 410,000 net tons; 1939, 607,000 net tons; 1940, 437,000 net tons.

Domestic price for No. 1 heavy melting scrap laid down at California mills was as low as $7.00 per net ton in the depression and reached a peak of $17.50 in March 1941, just before OPA Price Schedule No. 4 became effective. Average price for the year 1941 was $16.00, equivalent to $19.60 per gross ton.

Export prices were never a matter

HARBOR AT GUAM: *Quonset huts, for storage and barracks, line the shore at the B-29 base on Guam in the Marianas. Fighting craft are moored in the estuary.*

Muzzle FOR A MONSTER

In a thousand laboratories... in a thousand test tubes... under a thousand microscopes... science is fashioning a muzzle for a monster ... a leash that will control these cataclysmic forces and put them to work for man's gain.

Harnessing power... devising more efficient methods for transmitting it and controlling it... has been Twin Disc's one and only specialty for 27 years. As a result, you'll find Twin Disc Clutches and Hydraulic Drives in all industries and in all types of modern power-driven industrial equipment.

If your new products require a connecting link between driving and driven units, there's a good possibility that Twin Disc's specialized experience in the design, manufacture and application of *proved power links*—both friction and hydraulic—can be helpful to you. Why not ask for recommendations today? TWIN DISC CLUTCH COMPANY, Racine, Wisconsin (Hydraulic Div., Rockford, Ill.).

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of record but best informed sources recollect that when the Japanese first came into the market in early thirties, they paid as low as $10 per gross ton and in 1940 they were paying as high as $22 per gross ton so that the average price was probably about $17. Starting on the same basis as domestic consumers, it is a matter of record that during their most desperate buying they were paying as high as $5.00 per gross ton premium or excess over the price which West Coast mills paid at the same time for the same material.

Dependable and well-informed scrap dealers vividly recall that late in 1939 the export price of steel scrap reached approximatey $23 per gross ton. In the early months of 1937 the same sources remember that considerable buying took place at a level of approximately $20 to $21 and the $23 prices paid in 1939 were for substantial tonnages in virtually unlimited contracts placed by the Japanese.

During the tight market supply period of 1941 and 1942 West Coast consumers brought into the San Francisco area very substantial tonnages on the so-called "remote price basis" which cost them up to $22 per gross ton. Even in the past year or two with an easier market situation, because of the peculiarities of the OPA schedule involving shipping point prices and freight differentials, West Coast mills have paid prices in excess of $17 per gross ton delivered to consuming plant, for No. 1 Prepared.

POSTWAR, it is generally estimated that West Coast domestic requirements for scrap will range between 925,000 and 1,000,000 tons per year for normal operation of present existing facilities. Of this total, approximately 650,000 tons will be for the steel mills outside of Fontana. Not only have open hearths been added by both Columbia and Bethlehem, and electric furnaces at several points, but capacity of former open hearths have been increased. Prewar steel foundry capacity of 20,000 tons has swelled during the war period to 300,000 tons and a postwar requirement of 200,000 tons of scrap for steel foundries is believed probable.

Considering postwar supply, a number of favorable factors immediately occur. Increased population and increased industrialization of the West Coast area will increase the normal generation of scrap. The railroads are expected to replace substantial quantities of roadbed and equipment, and a large volume of automobiles will be scrapped at least for the first five postwar years. There will be an immediate quantity of war facilities and surplus stocks scrapped and there is the possibility of at least some quantity of overseas material.

Therefore it is reasonable to assume that in the entire West Coast area a 20 per cent additional supply of scrap will be available for the 20 per cent prospective increased demand. In fact, the 40 per cent of all scrap generated in the three years preceding the war which was exported seems a liberal cushion. However, this scrap was generated under pressure and high prices, most of it from remote areas, most of it non-recurrent and on the clean-up side.

Taking the southern California market separately, there were an average of 180,000 tons exported each year immediately prewar from that area. Add to this 20 per cent of the immediate prewar domestic purchases of 250,000 tons in that market and another 60,000 tons will be available. Therefore it is reasonable to assume that up to 250,000 tons of additional scrap may be available in southern California postwar, including that tonnage of remote scrap which must be shipped into southern California to augment the supply.

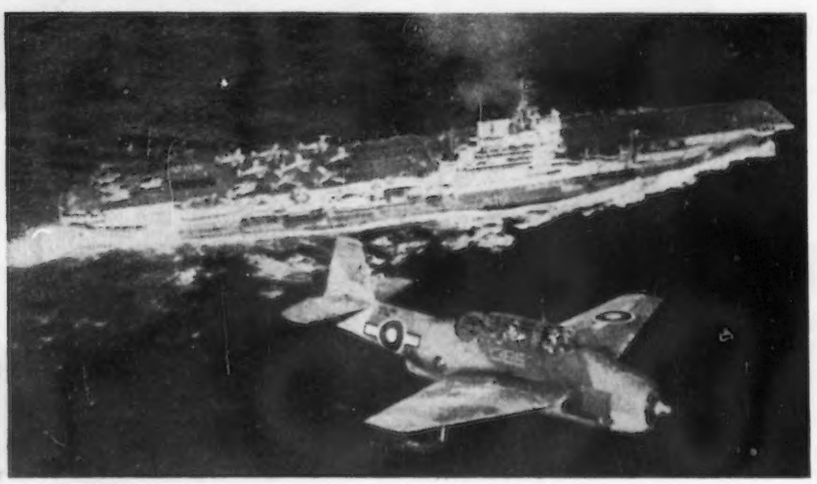
However, should the Kaiser mill come into the southern California market for this quantity or more, the area would no longer be "plus" and there is no likelihood that the price of scrap in southern California should then be less than in northern California.

Recalling the firm market prewar, when demand balanced supply because of pressure for export, and when the domestic price rose from $11.75 per net ton for No. 1 grade in 1938 to $16.00 for the same material four years later, there seems no reason why the same economic forces should not apply in an equally firm postwar market. Labor in dealers' yards formerly was paid 35c. an hr. and now receives $1.10. Trucking and general handling costs are sure to be higher postwar.

Under present conditions West Coast buyers anticipate that No. 1 heavy melting scrap will probably level off at something like $14.00 to $15.00 per net ton delivered to California mills in the immediate postwar years. However, if Fontana should come into the southern California market for anything over 25,000 tons per month, it seems very likely that the prewar situation under forced export demand would reoccur to firm the entire West Coast market, and especially southern California, so that price might well rise above $1.

If it should come about that the Geneva mill with its predominant pig charge should not operate postwar and Fontana should operate anywhere near the 900,000 tons aimed at by the management, with a scrap charge of anything over 25,000 tons per month, best informed and most experienced observers believe that the prewar days of scrap surpluses and bargain prices on the West Coast would have passed. Such a development might well upset the entire economy of steel making for the Far West.

VALUABLE SERVICE: ***An Avenger circles over the British carrier INDOMITABLE after returning from one of the strikes against Sakishima Island which began on March 26, 1945, thereby protecting the left flank of the American Okinawa campaign.***



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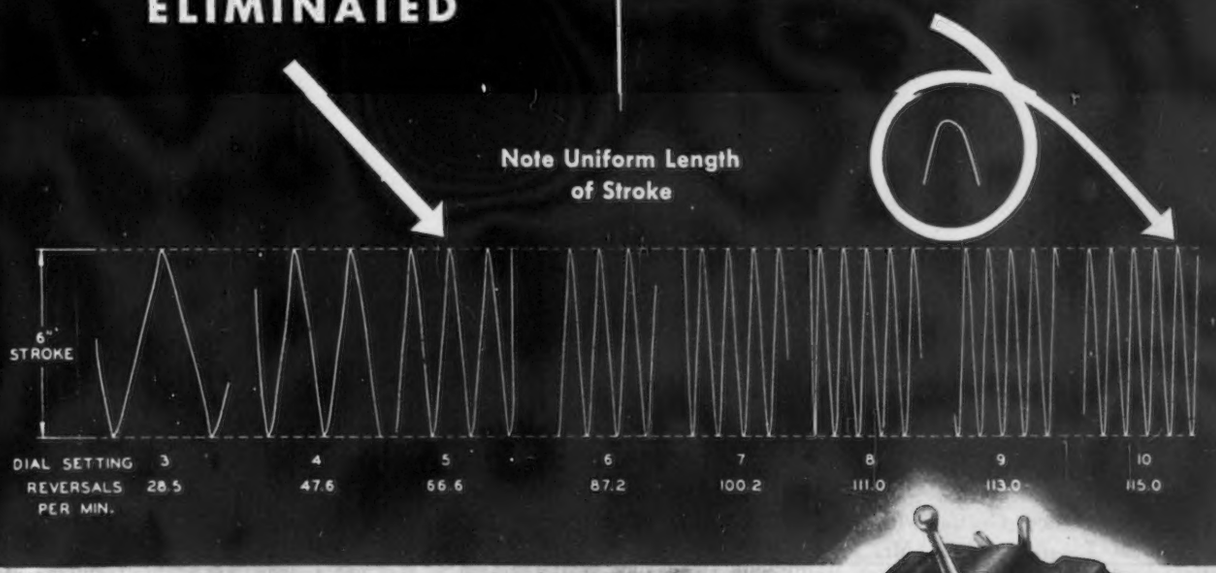
OVERRIDE PRACTICALLY ELIMINATED

SMOOTH REVERSALS AT ALL SPEEDS



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Representative of More Than 5,000 Standardized Vickers Units for Every Hydraulic Power and Control Function

This is a complete self-contained control unit for grinding machines, honing machines, or any process requiring a continuous reciprocating cycle.

The curves reproduced above were accurately made by a stylus attached to a reciprocating head and tracing upon a recording mechanism. Note uniform stroke length regardless of large changes in head or table speed. Throughout the test the setting of reversing trip dogs remained unchanged. An integral Vickers Hydrostatic Compensator makes flow rate (and therefore rate of reciprocation) independent of variations in resistance encountered. Similar tests and many installations show that at other speeds, loads and stroke lengths the same smooth reversals and accurate stroke length control are maintained.

Vickers Application Engineers will gladly discuss with you how "hydraulics" can be used to your advantage.

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PERSONALS

WILLIAM D. KENNEDY, vice-president and general manager, Wright Aeronautical Corp.

• **William D. Kennedy,** vice-president and manager of Wright Aeronautical Corp.'s Cincinnati plant, has been named vice-president and general manager of the corporation with headquarters at Paterson, N. J. Mr. Kennedy, who joined Wright in 1928, has succeeded **P. B. Taylor,** resigned.

• **G. S. Crane,** formerly vice-president in charge of sales and engineering, has been elected president of Cutler-Hammer, Inc., Milwaukee, succeeding **F. R. Bacon,** founder of the firm, who has resumed the position of chairman of the board which he formerly held. **H. F. Vogt,** in addition to continuing as vice-president, has been named chairman of the executive committee and also treasurer.

• **Frank M. Maly** has been appointed sales manager for plastic presses, The Baldwin Locomotive Works, Eddystone, Pa.

• **I. M. Smith** has been appointed acting general sales manager, Central Iron & Steel Co., Harrisburg, Pa., succeeding the former general sales manager, **G. S. Eastburn,** who has resigned.

• **Lester H. Roemer,** formerly assistant sales manager, The R. K. LeBlond Machine Tool Co., Cincinnati, has become New York district manager for the company. Mr. Roemer has been with LeBlond for 23 years.

• **Louis E. Underwood,** manager of the General Electric Co.'s Pittsfield, Mass., works, retired July 1.

• **Reuben E. Sommer,** formerly vice-president and general manager, Keystone Steel & Wire Co., Peoria, Ill., has been elected president succeeding **W. H. Sommer.** In addition to the presidency Mr. Sommer will continue as general manager. Other changes include the election of **Henry G. Sommer,** formerly executive vice-president and treasurer, as chairman of the board of directors, a newly created position; **D. P. Sommer,** formerly vice-president and general superintendent, as executive vice-president in charge of operations; **W. O. Fritze,** formerly secretary and assistant treasurer, as vice-president and treasurer; **Walter V. McAdoo,** formerly secretary to the Executive Committee and Director of Public Relations, as vice-president and secretary.

• **Charles P. Whitehead,** formerly vice-president, has been elected president, General Steel Castings Corp., Eddystone, Pa., succeeding **Harrison Hoblitzelle,** who has resigned. Mr. Hoblitzelle has been elected chairman of the board. **G. Fred Driemeyer,** manager of sales, has been elected vice-president in charge of sales; **George L. Alston** has been made vice-president and will continue also as secretary-treasurer; and **William M. Sheehan,** assistant vice-president, has become vice-president.

• **J. W. Ashby** has returned to the Columbus, Ohio, plant of the Janitrol Aircraft Heater Div., Surface Combustion Corp., Toledo, as manager of application engineering, after having served as Pacific Coast manager of engineering of the division. Also returning to the Columbus plant from Los Angeles is **G. P. Mandel** who has been replaced on the West Coast by **Burton M. Sharpe.**

• **Earl R. Kambrich,** formerly in the Dayton office, The B. F. Goodrich Co., Akron, Ohio, has been transferred to the Los Angeles district as a sales representative; **John W. Oakes** has succeeded him in Dayton. **R. L. Custer** has been transferred in the Detroit district from an aviation industry representative to industrial products sales.

• **William B. McGorum** has been made district sales manager, New York district, ACF-Brill Motors Co., New York.

• **Calvin Verity,** formerly vice-chairman and treasurer and a member of the Board of Directors, Rustless Iron & Steel Corp., Baltimore, has been elected president of the company succeeding **Charles R. Hook** who was both chairman and president. **W. W. Sebald,** a member of the Board, has been elected to the new office of first vice-president, and **G. D. Moomaw,** who has been vice-president in charge of operations and also a director, has been made vice-president and general manager, succeeding **C. L. Kingsbury** who has resigned. **George W. Clearwater** has been appointed treasurer.

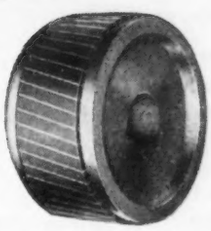
• **Harry R. Likens** has been appointed plant industrial engineer, South Chicago works, Carnegie-Illinois Steel Corp., succeeding **H. H. Rothrock,** resigned. Mr. Likens, who first became associated with Carnegie-Illinois in Pittsburgh in 1940, had been transferred to the district office as an assistant to the industrial engineer in 1943.

• **William A. Coyle** has been named district sales manager, H. K. Porter Co., Inc., Pittsburgh, Pa., which has transferred its district offices from Rochester to Buffalo. Mr. Coyle formerly was assistant combustion engineer of the Republic Steel Corp. in Buffalo.

• **John F. Hutson** has been named district sales manager for the Chicago territory, National Malleable & Steel Castings Co., Cleveland, succeeding **Tom W. Aishton** who has retired because of ill health. **Frank E. Moffett** has been appointed assistant Chicago district sales manager.

JOHN F. HUTSON, Chicago district sales manager, National Malleable & Steel Castings Co.

The Only Motor with a *Copperspun* ROTOR



Only in Fairbanks-Morse Motors will you find rotors centrifugally cast in *one piece*—and of *copper!*

The characteristics of copper make it the ideal rotor material. Copper has high electrical and thermal conductivity (twice as good as aluminum), greater strength, and low thermal expansion.

The indestructible copperspun rotor, with its better electrical characteristics, puts the new Fairbanks-Morse Motor far ahead of the times in stamina, in protection, and in versatility.

See a demonstration of what this motor can do for you. Write Fairbanks, Morse & Co., Fairbanks-Morse Building, Chicago 5, Illinois.

Every Good Feature You Could Ask!

Protected Frame—Excludes dripping liquids and falling particles.

Cross-flow Ventilation—Another exclusive feature. Air moves in both directions, providing uniform cooling—no hot spots.

Ball Bearings—Sealed in and protected.

Recessed Conduit Box—An innovation for neat installations in close quarters. Conventional box also provided.

Adaptability—Frame gives protection in any mounting position because the vented bearing brackets can be turned to four positions 90° apart. Reversible frame permits locating conduit box on either side.

Balanced Characteristics—A 40°C. motor with high efficiency and power factor, and excellent starting and accelerating torques.

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Diesel Locomotives • Diesel Engines • Generators • Motors • Pumps • Scales
Magnetos • Stokers • Railroad Motor Cars and Standpipes • Farm Equipment

ROBERT M. HONEGGER, general manager, Buffalo gear plant, Farrel-Birmingham Co., Inc.

• **Robert M. Honegger** has been appointed general manager of the gear plant at Buffalo, Farrel-Birmingham Co., Inc., Ansonia, Conn. He joined the Farrel organization in 1925, becoming general foreman in 1935 and shortly after, plant superintendent. Mr. Honegger, in his present capacity, succeeds **Lester D. Chirgwin**, now vice-president in charge of manufacturing in Farrel-Birmingham plants.

• **James H. Smith**, general manager of the Saginaw Malleable Iron Division, has been appointed to the staff of W. C. Williams, Jr., vice-president and group executive in charge of accessory divisions, General Motors Corp., Detroit. **B. A. Dollens**, manager of battery operations of the Delco Remy Division, Anderson, Ind., has succeeded Mr. Smith at Saginaw.

• **Roy C. McKenna** has been elected president, Vanadium-Alloys Steel Co., Pittsburgh, replacing **Floyd Rose**, resigned. He will continue in his present capacity as chairman of the board. **R. B. George** was elected sales vice-president, **L. D. Bowman**, production vice-president and **F. P. Underwood**, vice-president and secretary.

• **Archie V. Murray**, executive vice-president, Scaife Co., Oakmont, Pa., has been elected president, succeeding **J. Verner Scaife, Jr.**, who has resigned to devote more of his time to other interests. He retains his directorship in the company. Mr. Scaife has just returned to civilian life after three years' service with the Navy.

• **David F. Beard** has been named manager of advertising and public relations for the Aluminum Division, Reynolds Metals Co., Louisville. **Donald G. Dunn** has been appointed manager of marketing research of the division.

• **Conrad A. Goldstrohm** has returned to the American Chain Div., American Chain & Cable Co., Inc., Bridgeport, with headquarters at York, Pa. He has been serving as chief, Chain Section, Tools Div., WPB in Washington, D. C., since 1942.

• **Willis L. Wells**, chief engineer of the Curtiss-Wright Corp.'s St. Louis plant, has been transferred to the company's Buffalo plant as chief engineer in charge of aircraft design. **Edwin A. Warren**, manager of contracts at St. Louis, will become manager of the commercial sales department in Buffalo. **William W. Beardslee** has been appointed staff assistant to N. F. Vanderlipp, Buffalo plant manager.

• **Norman F. Melville** has returned to the Pittsburgh Steel Co., Pittsburgh, in his former capacity, manager of sales, steel and wire products. For the past year he has been serving as deputy chief of the Wire and Cold Drawn Bar Branch, WPB Steel Div.

• **Frank E. Murphy**, formerly assistant to the manager of the Research and Development Dept., has been appointed director of the development division, Research and Development Dept., Pennsylvania Salt Mfg. Co., Philadelphia. **Dr. C. E. Inman**, formerly with Hooker Electrochemical Co., **H. S. Fisher** of Aluminum Co. of America, **O. T. Aepli** of Attapulgus Clay Co. and **E. P. Street**, have also been added to the research and development staff.

• **Lt. Com. William J. Carroll**, has rejoined Carroll-McCreary Co., Inc., Brooklyn, as its president. He has been released recently from active service in the U. S. Navy.

• **M. B. Corbett**, former works engineer for Willys-Overland Motors, Inc., has been appointed plant engineer in charge of the Detroit and Washington Court House, Ohio, plants of Aeronautical Products, Inc., Detroit.

• **George D. Wilson**, formerly with the Detroit office of Latrobe Electric Steel Co., has been appointed manager of the Detroit office of Howell Electric Motors Co., Howell, Mich., succeeding **Frank Farrell**, resigned.

• **C. A. Weir**, formerly assistant general superintendent, Dodge Mfg. Co., Mishawaka, Ind., has joined Marshall & Huschart Machinery Co., Chicago. He will be in charge of the Northern Indiana and Western Michigan sales territories, succeeding the late F. A. Bennett.

• **Edwin R. Bartlett** has been elected president of the Hooker Electrochemical Co., Niagara Falls, N. Y., succeeding **Harry M. Hooker**, who has become chairman of the board. Mr. Bartlett previously had been executive vice-president.

• **J. P. Skehan** has been appointed assistant sales manager for sheet and Vuepak materials at Monsanto Chemical Co.'s plastics division, Springfield, Mass., succeeding **S. A. Bell**, resigned.

• **Albert F. Stuebing** has been appointed assistant to the manager of sales, high strength steel division, Carnegie-Illinois Steel Corp., Pittsburgh.

OBITUARY...

• **John B. Strauch**, 75, former chairman of the board of the National Bearing Metals Corp., St. Louis, died June 22.

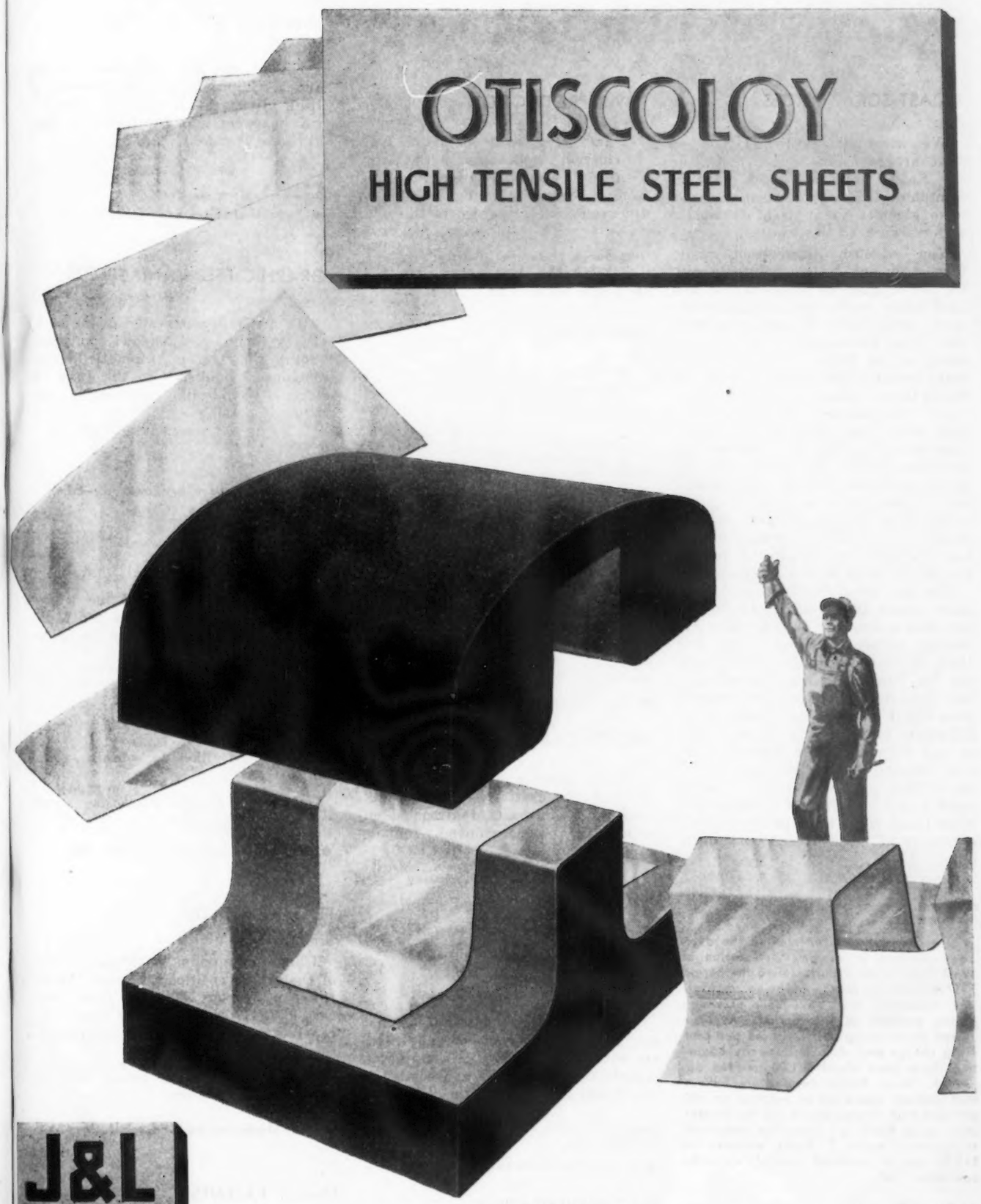
• **Robert A. Manegold**, 64, president of the Dings Magnetic Separator Co., Milwaukee, for 35 years, died June 20 after a brief illness.

• **Robert Spangler**, 41, sales representative for the past 18 years for the Oilgear Co., Milwaukee, died recently.

• **John W. Murphy**, manager of sales, rails and accessories, Bethlehem Steel Co., died suddenly at Bethlehem, Pa., June 24. Mr. Murphy had been with Bethlehem Steel since the early 1920's. He was 53 years old.

• **Frederick C. Renner**, general manager of sales, organic chemical division, Monsanto Chemical Co., St. Louis, died June 26. Mr. Renner was 44 years old.

• **Peter J. Richard**, advisory superintendent for Allis-Chalmers Mfg. Co., Milwaukee, for 12 years and an employee for 44 years, died June 20 at his home in Milwaukee.



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JONES & LAUGHLIN STEEL CORPORATION

PITTSBURGH 30, PENNSYLVANIA

Dear Editor:

COAST SCRAP PRICES

Sir:

We wish to compliment you on your article in the June 7 issue on the Kaiser iron and steel plant at Fontana. It is very evident that you have given a great deal of thought and research to this matter.

You evidently have been misinformed on one or two points in connection with recent prices of iron and steel scrap on the Pacific Coast, however, particularly in your statement that "The evaluation of this export scrap, about $17.00 per ton, represents the absolute maximum paid for West Coast scrap in recent times . . ." On several occasions the export price was considerably higher than $17.00 and in 1939 reached approximately $23 per gross ton. In the early months of 1937 considerable buying took place at a level of approximately $20 to $21 and the $23 prices paid in 1939 were for substantial tonnages in virtually unlimited contracts placed by the Japanese.

You also infer that in the last few years under OPA ceiling, $17.00 has not been exceeded. During the tight market supply period of 1941 and 1942, West Coast mills brought into the San Francisco area very substantial tonnages on the so-called "remote price basis" which cost them up to $22.00 per ton. Even in the past year or two with an easier market situation, because of the peculiarities of the OPA schedule involving shipping point prices and freight differentials, West Coast mills have paid prices in excess of $17.00 delivered consuming plant.

MARSHALL A. SHAPIRO,
President
California Scrap Iron Corp.,
Oakland, Calif.

● **The $17.00 figure represented the average valuation in customs declaration of West Coast scrap exports during the period 1937-40 and, by reason of being an average, necessarily must have been exceeded during portions of this period. Average overall Kaiser scrap costs, with 65 per cent scrap charge and close to capacity operations have been about $11.00 per ton delivered. Some Kaiser competitors believe that postwar operation at Fontana on 100 per cent cold charge would run the market price up to $20.00 per gross ton compared to author Charles T. Post's estimate of $13.50 on a modified partial capacity operation.—Ed.**

JAP MAP

Sir:

I thank you very much for your courtesy in granting permission to use the Japanese map from the March 1 issue in the Scripps-Howard papers.

JOHN H. SORRELLS,
Executive Editor
Scripps-Howard Newspapers,
230 Park Ave., New York

WAR PRODUCTION

Sir:

I am interested in the article "War Production" appearing in the Jan. 4 issue. It would be greatly appreciated if several clippings of this article could be forwarded to this office.

PAUL JOHNER,
Captain
Pittsburgh Ordnance District,
Pittsburgh 19

● **Copies mailed.—Ed.**

MILL SCALE

Sir:

We would appreciate your advising us the names of concerns who sell ground iron mill scale.

I. W. WILENCHIK
Metallurgical Products Co.,
35 & Moore Sts.,
Philadelphia 45

● **A list of suppliers has been mailed.—Ed.**

ALUMINUM FORGINGS

Sir:

Please send a copy of the article "Aluminum Press Forgings," which appeared in the May 17 issue.

MARION MARTONE
Chase Brass & Copper Co.,
Waterbury 91, Conn.

● **Tear sheets mailed.—Ed.**

NICKEL CAST IRON

Sir:

We are seeking nickel iron cylinder castings and castings for the crankshaft and camshaft of aircooled engines. Please recommend foundry suppliers.

A. L. HANSEN,
Purchasing Agent
Western Tool & Mfg. Co.,
3409 E. 18 St., Kansas City 1, Mo.

● **A list of foundry producers is on the way.—Ed.**

METAL STAMPINGS

Sir:

We find from your latest issue that you are furnishing one of your readers with a list of short run stamping suppliers. It would be appreciated if you would also send us this list.

S. H. SALOP
Harvard Lock Co.,
Reading, Pa.

● **A list of suppliers has been mailed.—Ed.**

RUST PREVENTATIVES

Sir:

Kindly send me a set of tear sheets of the interesting article, "Specifying Rust Preventatives," by J. Albin, published on June 7.

F. R. MORRAL,
Metal Trades Laboratory
American Cyanamid Co.,
Stamford, Conn.

● **Tear sheets mailed.—Ed.**

WELDING SPECIAL STEEL

Sir:

Kindly send me tear sheets of the article "Improving the Weldability of High Strength, Low Alloy Steels," which appeared in the issues of May 31, June 7 and 14.

L. P. TARASOV,
Research Laboratories
Norton Co.,
Worcester 6, Mass.

● **Tear sheets have been mailed.—Ed.**

GRAPHIC FEEDS AND SPEEDS

Sir:

We are quite interested in the article by John J. Meadows, entitled, "Setup Charts for Automatic Screw Machines," published in the June 14 issue. Would like to receive six copies if possible.

JOHN P. O'CONNOR
Donoco Aircraft Products,
Div. of Schuman & Donchi,
Newark, N. J.

● **Tear sheets have been mailed.—Ed.**

MULTIPLE DRILLING

Sir:

Would you please send me a reprint of "Time Allowances for Multiple Spindle Drilling," from the issue of May 31.

J. R. WANDLING,
Wage Standards Department
Eastman Kodak Co.,
Rochester

Sir:

We would like to obtain four copies.

D. A. WILSON,
General Purchasing Agent
Canadian Westinghouse Co., Ltd.,
Hamilton, Canada

● **Tear sheets have been mailed.—Ed.**

PLASTIC MOLDS

Sir:

I am very anxious to obtain a copy of the article entitled, "Plaster Molds for Non-Ferrous Metals," from the Oct. 9, 1941, issue. If tear sheets or reprints are available, will you please send me a copy?

CARL P. MANN,
Manager Drying Division
Selas Corp. of America,
Philadelphia

● **Tear sheets mailed.—Ed.**

ENEMY PATENTS

Sir:

We would appreciate your sending us four copies of seized patents. Enclosed check for $1.20 covers above lists.

A. H. SONON,
Chief Engineer
Maryland Engineering Co.,
Baltimore 8

● **Copies mailed.—Ed.**

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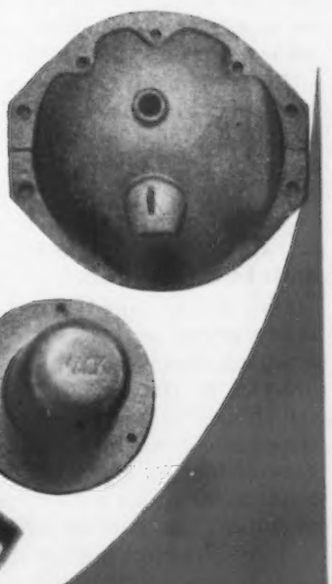

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This Industrial Week . . .

- ***Deliveries Become Easier Than a Month Ago***
- ***Some August Deliveries on Nonrated Orders***
- ***Steel Rate Drops Two Points to 89.5 Pct***

WITH lighter advance buying, more cancellations and some easement in inventory pressure, available delivery dates on most steel products were this week 30 to 60 days closer than openings quoted about a month ago. Indications are that the delivery situation will be considerably better especially for civilian manufacturers sometime in the latter part of this quarter.

Steel mills entered the period this week when nonrated orders may be shipped provided they do not interfere with war business, but this permission meant little to domestic users of steel because order books were still heavily loaded with rated orders having first call on available supplies.

Despite the apparent solid front presented by loaded mill schedules, some unrated tonnage has found acceptance. July delivery on unrated plate orders has been promised in at least one or two instances by a major eastern producer. Another producer whose schedules nominally are filled into the fourth quarter is reported to have booked several hundred tons of bars for August delivery.

The pressure from nonrated customers on steel mills to take tonnage and promise deliveries has become terrific in recent weeks. This presents more of a problem to steel companies than is at first evident. From a competitive standpoint most steel firms will want to take as much nonrated business as possible, as well as make the best delivery promises in order to maintain a good postwar customer relationship.

Steel companies, however, except in a few instances, have not been able to help their customers' plans by furnishing firm delivery promises. Until such time as many cutbacks are reflected in steel mill schedules, there will be little chance for domestic steel buyers to obtain any appreciable amount of supplies except in rare cases where spot openings have developed and must be filled quickly.

One factor noted especially this week which will tend further to confuse the order book picture is the reported duplication in nonrated steel bookings. The practice of placing the same order with several steel companies is gaining momentum and recalls peacetime periods when this was done on a large scale. The general idea of consumers following this procedure is to place the order with more than one firm in the hope of gaining an earlier delivery. There is no apparent way for the steel mill to check this practice.

THE War Production Board's quandary as to why sheet openings have not appeared as a result of fabricated product cancellations may be behind a request to sheet producers to tabulate and report all third quarter sheet orders of consquence on the books with customers' names. The receipt of this information will be followed, it is believed, by a check with consumers as to the possibility of additional cancellations. Some steel users already have been contacted.

Quoted deliveries on steel products, especially sheets, strip, quality carbon bars and structural shapes, were still quite extended this week. None were available on current ordering much before the latter part of the fourth quarter. An increase in cancellations, however, would change this situation and there is considerable speculation in steel circles that the entire steel delivery picture will come in for a sudden change within the next few months.

Without much fanfare coated sheet products gradually are becoming easier from a delivery standpoint. Heavier tinplate directives are making rapid progress in dissolving extended schedules. Tinplate deliveries for the first time show marked improvement, with some promises being made for November as compared to January promises quoted a month ago.

Galvanized sheets, for many months one of the longest delivery items in the book, show promise of becoming easier. With any improvement in manpower, the availability of coated steel products should become greater. Despite the general extended promise on tinplate, one mill is offering August delivery on this product.

CUTBACKS on shell container and storage case programs announced this week by the Army promise little early sheet relief. The cut in monthly container and storage case schedules to become effective in July and August will lower the level of sheet requirements somewhat, but the effect on mill books will be delayed and continued requirements although lower will still be quite heavy in the future.

Relaxation of railroad carbuilding schedules has been made by WPB to permit builders to arrange their own schedules to suit operating conditions. This will not affect cars already scheduled. Army car awards recently included 864 30-ton box cars to Pullman-Standard Car Mfg. Co.; 120 30-ton high side gondolas, 120 low side gondolas and 700 40-ton gondolas to American Car & Foundry; and 800 40-ton gondolas to Ralston Steel Car Co. The Army is placing a contract on the West Coast for 10,000 narrow gage wood freight cars with steel frames to be shipped overseas.

The Erie Railroad is inquiring for 600 70-ton drop end gondolas, 700 50-ton box cars and 100 70-ton covered hoppers. Southern Pacific is inquiring for 50 steel wood lined cabooses, and Rock Island is inquiring for 1000 steel sheathed 50-ton auto box cars.

Because of vacation shutdowns and some Independence Day curtailments, the steel ingot rate this week is estimated at 89.5 per cent of rated capacity, down two points from last week's rate.

• **KAISER'S STEEL PLANS**—A complete strip mill including tinplate facilities and a pipe mill with primary capacity for merchant pipe are included in the application of Kaiser Co., Inc., for additional facilities at Fontana contingent upon adjustment of the company's RFC loan. The Kaiser management has long-run plans for additional capacity at Fontana up to 900,000 ingot tons per year. A. B. Ordway, vice-president and general manager of the Kaiser Iron & Steel Div. recently moved his administrative offices from the Latham Square Bldg. in Oakland to the steel plant at Fontana where the entire operating and executive staff is now located.

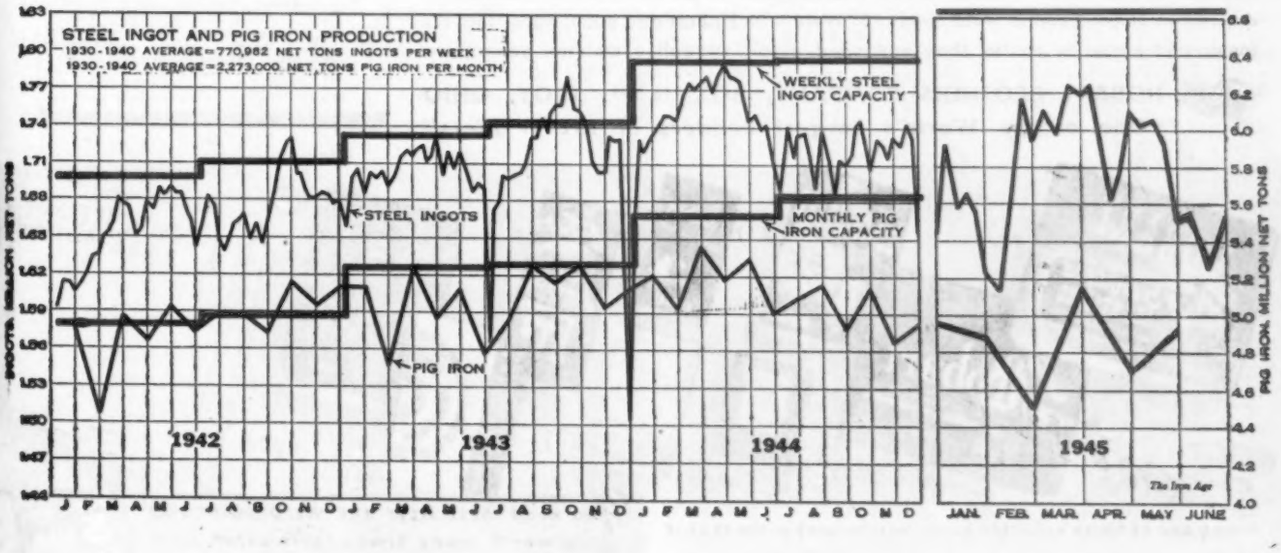
• **INCENDIARY BOMB CONTRACT**—The Evansville ordnance plant operated by Chrysler Corp. has been awarded a new chemical warfare service contract to produce 7,500,000 incendiary bombs made of metal loaded with a mixture of magnesium, gasoline and other materials. Output will be at the rate of 1,500,000 units and upward monthly as soon as facilities are ready. About 3000 persons, many of them women, will be engaged in the program.

• **APRIL SCRAP SUPPLIES HIGHER**—Stocks of iron and steel scrap at plants of consumers, suppliers and producers increased slightly in April 1945, approximating 4,907,000 gross tons at the end of the month, representing a gain of nearly 1 per cent over the 4,873,000 tons reported on Mar. 31, according to a statement released by the Bureau of Mines, U. S. Dept. of the Interior. Consumers stocks on Apr. 30 were 3,710,000 tons compared with 3,646,000 tons on Mar. 31, while combined stocks of suppliers and producers were 1,197,000 tons and 1,227,000 tons on the same dates. The net gain in total supplies of scrap was due to the increase of 100,000 tons in stocks of purchased scrap held by consumers, which was partially offset by decreases of 36,000 tons in consumers' home scrap and 30,000 tons in the suppliers' and producers' inventories.

• **MORE ABOUT CUTBACKS**—A series of military curtailments in Detroit, revealed late in June, was headed by word that the General Motors Corp. contract for heavy M-26 tanks being produced at the Grand Blanc Tank Arsenal operated by the Fisher Body Div. is being rescheduled downward leading toward complete termination in April of next year. The rescheduling affects approximately 3000 tank units and spare parts at an estimated value of more than $211,000,000 over a period of ten months. Some of the slack in the plant, however, will be taken up by contracts now being negotiated for combat vehicles. The Bullet Core Div. of Willys-Overland Motors, Inc., Toledo, will cease production of .30 and .50 caliber ammunition at the end of June, and the plant is being put in standby condition for possible future calls for this type of ammunition. At the same time the company's schedules on 155 mm shells have been cut back; and a cutback in the output of jeeps also became effective during June. About 1000 people are immediately affected by these cutbacks. Production of truck cargo bodies at Covered Wagon Co., Mt. Clemens, Mich., has been reduced over the next six months, affecting about 1700 bodies with estimated value of approximately $500,000.

• **INGALLS TO MAKE LOCOMOTIVES**—Ingalls Shipbuilding Corp., Birmingham, is making preparations to enter the diesel-electric locomotive manufacture field. The corporation has one locomotive for switching purposes under construction at its Pascagoula, Miss., shipyard and plans have been drawn for diesel-electrics for passenger and freight service. Construction of the locomotives on a considerable scale at Pascagoula is planned as soon as materials are released. Entrance into the new field will not affect the operations.

• **FIRST TO ANNOUNCE**—Ford Motor Co. became the first auto producer to formally announce its 1946 models, when assembly line output began at Dearborn this week. Fords will be produced in six super deluxe body styles and three deluxe styles after first runs of a few models are completed. Five super deluxe Mercury cars will eventually be built. Near-term plans call for combining Mercury production with Lincoln and undertaking Lincoln-Mercury assembly for the first time outside of the Detroit area.


STEEL INGOT AND PIG IRON PRODUCTION
1930-1940 AVERAGE = 770,962 NET TONS INGOTS PER WEEK
1930-1940 AVERAGE = 2,273,000 NET TONS PIG IRON PER MONTH
WEEKLY STEEL INGOT CAPACITY
STEEL INGOTS
MONTHLY PIG IRON CAPACITY
PIG IRON
1942
1943
1944
1945
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
JAN. FEB. MAR. APR. MAY JUNE
PIG IRON, MILLION NET TONS
The Iron Age

Steel Ingot Production by Districts and Per Cent of Capacity

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
June 26	89.0*	95.5	92.0	93.0	98.5	106.5	91.0	93.0	86.0*	73.0	71.0	75.0	95.5	91.5
July 2	85.0	94.5	92.0	93.0	92.5	104.5	90.0	95.0	90.5	76.0	93.0	75.0	50.0	89.5

* Revised

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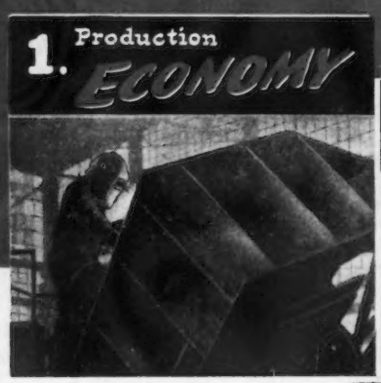

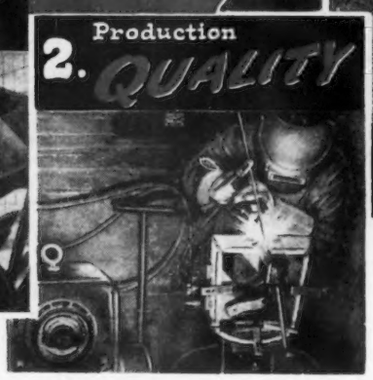

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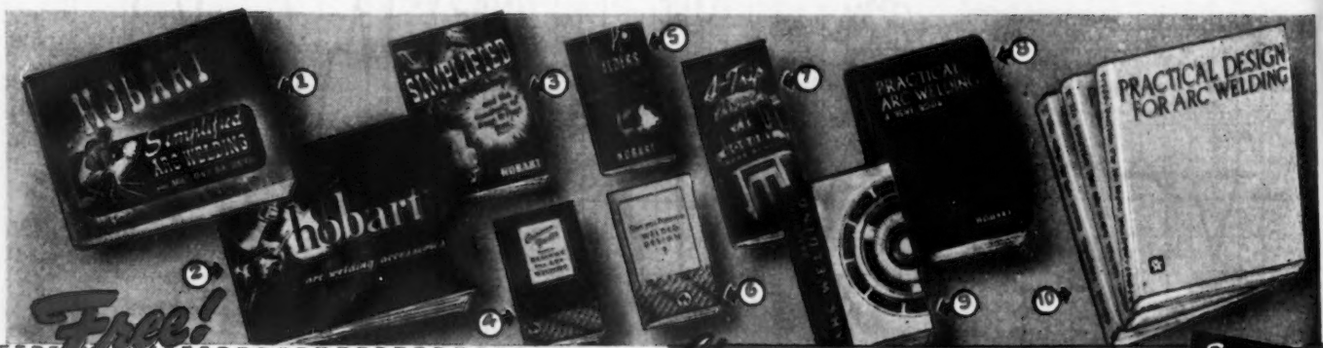

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Cement Institute Basing Point Setup Under Attack by Government

Washington

• • • A source of attack by the government for the past 25 years, the basing point system was the object of one of the last official acts of Attorney General Francis Biddle. Three days before he retired from that position, he filed at Denver, a complaint charging the Cement Institute, Chicago and its membership of 89 manufacturing companies with conspiracy to maintain "unreasonable," identical and non-competitive prices in the manufacture of portland cement in violation of the Sherman Anti-Trust Act." These alleged violations, it was charged, are due to the use of the multiple basing point system.

The proceedings against the Cement Institute, which have been before the Federal Trade Commission, the Department of Justice and the courts for years, manifestly is directed against the steel and all other industries which use the multiple basing point system. The forays against the basing point system are being carried on under a cross-fire by the FTC under the price discrimination clause of the Clayton Act and by the Department of Justice under the Sherman Act. The case filed against the Cement Institute probably will be the first to come before the Supreme Court, which, upholding the FTC, recently knocked out the single basing point system as illegal under the Clayton Act. The decision, affecting two glucose manufacturers, did not pass on the merits of the multiple basing point system.

The Cement case is now tossed into the lap of Attorney General Tom Clark, successor to Mr. Biddle.

The Department of Justice, like the FTC, wants the basing point system abolished completely except that it is willing for continuance of the delivered price basis of quoting at the discretion of the buyer, provided the mill charges only its base price, plus the cost of the actual transportation to the purchaser.

Specifically the department seeks the following action by the court:

1. Dissolution of the Cement Institute;

2. A requirement that the cement mills quote prices and sell cement either f.o.b. mill or on a delivered-price basis, at the election of the purchaser;

3. A requirement that each mill establish separately the same mill price for all buyers of the same class purchasing similar quantities, without reference either to destination point or use of the product;

4. A requirement that each mill refrain from changing its mill price regardless of the method of transportation by the purchaser;

5. A requirement that each mill quote or sell at delivered prices by charging only the mill price plus actual common carrier transportation cost, with the privilege reserved to the purchaser to designate the mode of transportation and with the privilege of any mill to meet the delivered price of any competing mill at any destination point by absorbing a part of the transportation cost;

6. A requirement that no mill shall charge any buyer a delivered price which is higher than the mill price plus the actual common carrier transportation cost.

The complaint also charges that in order to eliminate any differences in the computing of freight rates cement manufacturers collectively prepare and use so-called "freight rate books" in quoting the delivered prices of cement at any given locality.

It is further charged that the manfacturers refuse to quote prices f.o.b. mill, refuse to ship by water or truck, and refuse to permit a buyer to take delivery in his own trucks at the mill unless the price to the purchaser includes the all-freight charge from the nearest "base" mill to the point of destination.

The complaint also charges that in order to force adherence to the multiple basing point formula the defendants:

1. Impose law and punitive base-mill prices in locations where a mill or mills refuse to follow their system of fixing prices;

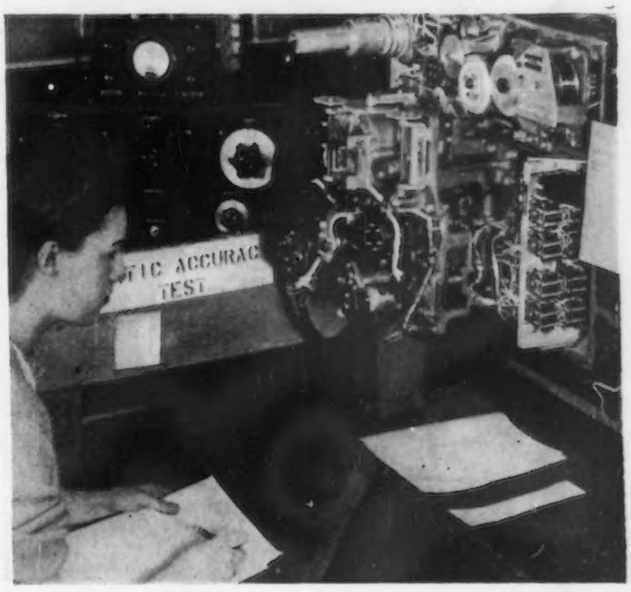
2. Have standardized the product as to quality;

3. Have standardized terms and conditions of payment;

4. Make all price changes simultaneously through the device of requiring such changes become effective only in the event that all mills indicate acceptance by issuing similar announcements within five days; and

5. Facilitate price advances by restricting the volume of cement manufactured and preventing accumulation of surpluses.

The case is in charge of George B. Haddock, chief of the Midwest and Mountain States Offices of the Anti-trust Div., and Ernest L. Branham, Special Attorney, under the general supervision of Holmes Baldridge, head of the General Litigation Section of the Division.



B-29 COMPUTER —*"Brain in a box" that is the General Electric computer for the B-29 undergoes a "mental" exam before taking its place in the gun-fire control system which the company is supplying in quantities for Superfortresses.*

Retiring Biddle Aims Heavy Blow At Steel Corporation's Hopes for Geneva

Washington

• • • **Confusion over a policy** for the disposal of the two western war built steel plants, one at Geneva, Utah, and the other the Kaiser plant at Fontana, Calif., mounted last week. On June 29, Attorney General Biddle, two days before his retirement, sent a report to Congress laying down a Department of Justice plan, opposing purchase by Eastern producers, clearly a shaft directed at the United States Steel Corp., which is a bidder for the plants, particularly Geneva, which is operated by a subsidiary.

On the previous day three western Senators addressed a letter to Fred M. Vinson, Director of War Mobilization and Reconversion, emphasizing "the importance of early and courageous decision as to the ownership, financing and other circumstances affecting the operation of these plants." Mr. Vinson was urged not to let any considerations stand in the way of early decisions leading to the effective utilization of these plants, which, it was declared are threatened with a complete shut down before autumn unless ways and means are found to bring about their continued operation.

There are reports that western Senators do not share views expressed by Mr. Biddle and which could well be revised by his successor, Tom Clark.

The letter was written by Senator J. C. O'Mahoney, Democrat, of Wyoming, chairman of the War Contracts Subcommittee of the Committee on Military Affairs, whose staff recently issued a report on war time steel expansion. Besides Senator O'Mahoney the letter was signed by Senator Abe Murdock and Senator Elbert D. Thomas, Democrats, of Utah.

To give another tint to the picture both the Biddle report and the Senatorial letter emerged on the eve of a forthcoming report from the Surplus Property Board that will deal with a policy for the disposal of steel plants. The question now is one of fitting the various views into a single pattern, which might well be finally determined by Congress if the SPB recommendations are not acceptable to it.

Both the Biddle report and the letter to War Mobilizer Vinson give great weight to the urgency of the problem. The Senators told Mr. Vinson that the continued operation of the two steel plants is one of the keystones for the achievement of full production and employment throughout the nation after the war. By what is done with respect to the utilization of these plants, said the Senators, "we may judge the ability of the nation to reconvert from war to peace." They called upon the War Mobilizer to review again the situation in cooperation with all agencies of the government so that "these agencies which are concerned with this problem may use their best efforts and means at their disposal to assure continuing operation of the two plants."

Whatever may otherwise be his reaction to letters from the Senators, Mr. Vinson apparently will not ask for a revision of the Surplus Property Act, which comes under his jurisdiction. This is indicated by Mr. Vinson's quarterly report just submitted to Congress. Mr. Vinson gave the Act his mild if not cordial blessing when he said that "by and large, it is becoming increasingly evident that the spirit—and even the letter—of the Surplus Property Act does not present insurmountable obstacles." But there is much congressional criticism of the law and the sentiment for a change was strengthened by recommendations by retiring SPB Chairman Guy M. Gillette in a report to Congress. This report, made simultaneously with the Vinson report, said that there should be a single administration of the sales of billion of dollars worth of goods. Mr. Gillette in a letter to Senator O'Mahoney said he reached this conclusion based on experiences as a board member pointing out that previously as a Senator he had favored administration by a board. He said too that the agency should be established independently and subjected to policies of the Office of War Mobilization. Mr. Gillette also asked that Congress lower from $5,000,000 to $1,000,000 the minimum level on which a sale of a plant must be reported to the Attorney General.

Aside from passing to Mr. Vinson the job of giving his best efforts to get agreement among the agencies on a disposal program, Senators made no recommendation.

In contrast, and as required by Congress, Mr. Biddle, who emphasized in particular western demand for tin plate as a postwar market for western plants, outlined fifteen points, looking to the supply by the western plants of the west's demand for tin plate containers. He said that a survey showed that 20 per cent of all United States tin plate consump-

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THERAPY: *At the Army Hospital in Pasadena, Calif., a soldier works out a design in transparent plastics, which is airplane scrap turned over to hospitals to aid servicemen's rehabilitation. Scrap is also used to make tools.*

o o o

tion is in the west, although before the war all this market was supplied by the East. It indicates, he pointed out, a post-war Western tin plate market sufficient to provide a basis for large-scale operations provided certain requirements are met.

The most important, he declared, are:

Elimination of monopolistic control from the East which includes a basing point system resulting in artificially high prices in the West.

Establishment of railroad rates which bear logical relationship to transportation costs on raw materials and semi-finished products within or into the region.

The Biddle report, given especial importance because it comes at a time when RFC is considering a further loan to Henry F. Kaiser for operations of the Fontana plant, said that western basic steel production has more than doubled during the war, with the 1,280,000 ton ingot capacity of the government-owned plant at Geneva, and the 675,000-ton ingot capacity of the government-financed plant at Fontana accounting for the increase. Declaring that the policies of the purchasers of the Geneva plant "may well be the determining factor in the future of the Western steel industry," Mr. Biddle urged that complete cost studies be made available to potential buyers. His opposition to Eastern ownership of Geneva was expressed in a warning that "control of Western operation by Eastern steel interests does not promise independent and competitive pricing."

The report declared that about 95 per cent of the tin plate industry is controlled by eight integrated steel companies and that "historically, tin plate prices have been determined principally by negotiation between the American Can Co., the principal buyer, and the United States Steel Corp., the principal seller." The report said that estimates place postwar Western tin plate consumption at 500,000 tons annually and concluded that Western mills should be able to sell about one-half the total. Competition, it was added, would come from Eastern plants with all-water access to the coast, such as Sparrows Point, Md., and Birmingham, Ala.

The report said that all the information now available appears to point toward favorable operating costs for Western tin plate production. But, it was asserted, potential purchasers of the Geneva plant should have made available to them an adequate appraisal of its operating costs. It was pointed out that a cost study of the Geneva plant has been undertaken by DPC and is expected to be completed by October. Mr. Biddle recommended that the results of this study be made available on a widespread basis, and that in the meantime such interim information on the results of the study as possible be given to potential purchasers.

In the course of 15 points summarizing conclusions, many of which deal with data on western production, development and demand, Mr. Biddle said that continuous production of steel products in the west affords the most promising possibility for utilizing the large investment at Geneva, but that such operations must be able to envisage a substantial market for light flat rolled products such as sheets, strip and tin plate. Market participation, will not, however, be achieved, the report said, without aggressive independent pricing. Successful operation of Geneva, it was declared, requires Western tin plate prices which are unattractive to inland Eastern producers. Even on the basis of 1937 demand for steel, the report said, continuous production in the West is justified if independent operators are not saddled with excessive investment costs. Western fabricating industries, it was declared, can be expected to develop only when the cost of steel is competitive with similar costs in other sections of the country.

U. S. Steel Capacity Will Not Be Larger But Smaller Postwar

Chicago

• • • **Total postwar** steelmaking capacity of U. S. Steel Corp. subsidiaries will not be much larger, and possibly somewhat smaller than at present, Irving S. Olds, chairman of the board, U. S. Steel Corp., said here June 25.

The steel corporation will aim to maintain its relative producing position in the industry, emphasizing low cost units favorably located with regard to markets and gradually eliminating obsolete, high cost plants.

Expanding markets in the South and West, Mr. Olds said, paint a rosy picture for subsidiaries in those areas. Asked whether funds had been set aside for expansion of Columbia Steel Co., Pacific Coast subsidiary, Mr. Olds said that $8 million appropriated for expansion and modernization early in the war there had not yet been spent.

He was questioned concerning a statement made to Defense Plant Corp. early this year by Benjamin F. Fairless, Steel Corp. president, that if the Steel Corp. were successful in acquiring the Geneva plant it would reduce or displace existing basic steel making capacity correspondingly. He said that such a reduction in capacity would take place among the corporation's less efficient producing units in the East, including the Pittsburgh district, rather than the South, Midwest, or Far West. Even though Geneva were expanded to include cold reduced tinplate capacity under postwar operation by the Steel Corp., cold reduced tinplate capacity would not be reduced at corporation plants elsewhere. Carnegie-Illinois recently announced that it would increase its capacity for cold reduced tinplate in Pittsburgh and Chicago districts by 233,000 tons annually and Tennessee Coal, Iron & Railroad Co. plans a 52,000 ton increase.

Mr. Olds characterized as "the $64 question" the matter of whether a reduction in freight rates from Geneva to the Coast sufficient to place it in a competitive position would not lead to attempts to revise the entire western freight rate structure on steel. He expressed the belief that the railroads would cooperate in making continued operation of Geneva possible, however.

He declared that studies of interplant inequities as provided by the War Labor Board ruling of Nov. 25, 1944, were nearing completion but pointed out that how soon the results would be accepted rested with WLB.

Both Mr. Olds and Mr. Fairless, who participated also in a press conference preceding a meeting of the board of directors, declared that U. S. Steel would strenously resist unionization of foremen on the grounds that supervisory officials were a part of management. Mr. Fairless indicated, however, that concrete steps to deal with the problem would not be taken until the matter came to a head in the corporation's own plant.

Discussing barriers to full capacity operation, Mr. Fairless said that manpower shortage in the corporation's own plants was a single factor, though an important one. Labor shortage in the refractory industry has caused a shortage of refractories necessary for full operation, he revealed.

Inventory Limit Cut to 45 Days

Washington

• • • **Restrictions on** allowable inventories of steel sheet and strip are expected to be tightened this week with the announcement by WPB that the 60-day limitation on inventories in the hands of manufacturers now prescribed by CMP Regulation 2 will be reduced to 45 days. It is reported that this action was the result of a conference WPB Chairman J. A. Krug held last week with steel executives. Particular emphasis, it was stated, will be laid on checking inventories of light gage sheets, 16 gage and lighter which are the principal bottleneck items.

The new directive would require consumers to cancel all orders for steel sheet and strip which would bring their inventories above the 45-day limitation and is in line with WPB's program to ease the situation wherever possible through cancellations of orders now placed with the mills. Voluntary cancellation of orders is expected to be asked by WPB in those instances where similar inventories of sheet and strip could be maintained without interfering with the production schedules of the company involved. With third quarter production of sheet and strip expected to be in balance with screened requirements, WPB expects to do everything possible to preclude hoarding of steel sheet and strip so that available supplies may be equitably distributed.

* * *

Washington

• • • **Earlier estimate by** WPB Chairman J. A. Krug that 1,000,000 tons of free steel would be available for civilian use in the third quarter is expected to be revised downward by approximately 15 per cent to 850,000 tons or even more sharply reduced. It was said that this reduced estimate is due to adjustments that take into account the seasonal decline in steel production due to hot weather, prospective labor troubles and withdrawal of key workers in the 26-29 age group because of cancellation of deferments.

The possibility of 300,000 tons of sheet and strip being available on an unrated basis in the third quarter likewise is said to be becoming increasingly uncertain. This is attributed to a larger carry over of unfilled orders from the second quarter, increased programming of such items as washing machines and refrigerators and continuing military requirements for light gage sheets.

No Aluminum Utensils Pending War Releases

Washington

• • • **Because facilities** and materials for making aluminum utensils are still largely needed for the war effort, no appreciable increase in production is expected until the fourth quarter, manufacturers said at the recent meeting of the Aluminum Utensil Industry Advisory Committee, the WPB reported.

Lack of availability of mill circling facilities and soft aluminum sheets is the greatest handicap to be overcome, manufacturers agreed. Sheet aluminum is required by the industry in the form of circles, which are then shaped into the utensils. These circles are not in sufficient supply for the full reconversion needs of the industry, and, in addition, the shaping mills are heavily occupied with war contracts.

Although cutbacks of some aircraft contracts have released quantities of aluminum sheet, these sheets for the most part are not of the kind required for utensil manufacture.

Sufficient aluminum ingots of the type used for cast ware are available, officials said, and some facilities are also available for this type of production.

A large part of the aluminum utensil industry's manufacturing facilities is still occupied with direct war production of such items as aircraft parts and shell cases, committee members reported.

To Buy Container Sheets

Washington

• • • **While the** specific quantities have not been estimated, the Quartermaster Corps of the Army is preparing to purchase heavy tonnages of hot and cold rolled sheets to be sent overseas for manufacture into 5 gal. cans and 55 gal. drums to contain fuels and lubricants. Most of the sheets will be 18 and 20 gage but some will be 12 to 14 gage.

The containers will be made in 12 plants, five in the Pacific area and the other seven in the Persian Gulf area. Seven plants are now operating and five more are to be added. Some of the plants are privately operated and others are operated by the Quartermaster Corps.

Spokesmen for the Corps said that it is more economical to transport fuel across the Pacific in bulk than in containers and also "a lot more economical to ship steel across the Pacific in flat plates than to ship the fabricated cans."

Bond Tests on Bars Reported Complete

Pittsburgh

• • • **Bond tests on** concrete reinforcing bars, made by the committee formed under the direction of the American Iron and Steel Institute on reinforced concrete research, were completed recently and results established. The reinforced concrete research committee is operating on a three-year program to plan and conduct researches in reinforced concrete and their proper interpretation. After the work is completed, recommendations in respect to changes in design requirements will be advanced.

The bond tests were the first of a series of structural research programs, which included also anchorage studies, design stresses, effect of plastic flow and shrinkage, footing tests, studies of torsional stresses and highway and airfield research. Some of these studies are being run simultaneously, but the bond tests were completed a short time ago.

Of 17 bars tested, four were commercial bars and 13 were experimental, five bar samples showed results of being most satisfactory. These five bars, only one of which is a commercially produced bar, ran 50 to 65 per cent higher in bond strength than the remaining bars. This was the evidence of a study that included 140 tests per bar. The one commercially produced bar that stood up as one of the five best bars was a bar that was introduced only a short time ago by a Midwestern producer.

A committee has been appointed to prepare a definition of a deformed concrete reinforcing bar that will probably cover all commercially produced deformed bars. However, an industry bar is wanted, and it is hoped by this committee that after a study of production costs and manufacturing facilities of the 21 bar producers, one of the five best bars will be chosen as the "industry bar."

C F & I Submits Proposal for Geneva

Denver

• • • **Colorado Fuel and Iron Corp.** submitted to Defense Plant Corp. late in June an outline of proposed modifications of the Geneva, Utah, steel plant for postwar production and urged that the plant be leased to it without delay, it was revealed last week.

The proposal embodies production facilities for light gage sheet and strip, tinplate, butt weld pipe, railroad springs, wheels and axles and a railroad car manufacturing shop.

Colorado Fuel and Iron visualizes annual production of 700,000 tons of finished steel products and fabricated railroad equipment at the plant broken down as follows: 105,000 tons of structural steel, 120,000 tons of plates, 162,000 tons of strip and sheets, 100,000 tons of tinplate, 48,000 tons of butt weld pipe, 45,000 tons of steel springs, wheels and axles, and 120,000 tons of railroad cars and accessories.

The proposed additions would cost $73 million. Of this amount the strip and tin mill would cost $48 million, butt weld pipe plant $1,225,000, railroad car shop $9½ million, car wheel shop $2,750,000, spring plant $500,000 and additional power plant capacity and other facilities $8 million.

C F and I estimated that the plant would employ from 8 to 10 thousand per year. In asking that the lease be concluded as soon as possible, C F and I cited its many years of steel making experience in the West and its familiarity with the railroad equipment field.

Issues Price Spread On Wire, Keg Nails

Washington

• • • **Retail sellers** of bright wire and common nails in keg lots have been given specific dollar-and-cent mark-ups over cost, effective July 2, replacing former freeze ceilings, the OPA has announced.

Although mill and wholesale prices for all wire nails and staples, except those made of galvanized iron, were increased 25c per hundred pounds in January, 1945, and an additional 10c per hundred pounds in May, sellers at retail have been restricted to their March, 1942, highs. The second mill increase aggravated the squeeze, and today's action was necessary to prevent hardship and enable the widest possible distribution of this commodity.

On retail keg lot sales of 100 lb. net, sellers who buy from jobbers may add 75c to their delivered cost. Cartage from the local freight terminal may not be added, OPA said. On retail sales of nails in 50 lb., net, containers, the mark-up allowed over the cost base is 40c.

If the retailer buys direct from the manufacturer, the cost base may include freight computed at carload rates, but no cartage, OPA said. In this case, the allowed mark-ups are $1.10 and 55c, respectively, for 100 and 50 lb. sizes.

Retail sellers who did not sell 50 lb., net, containers in March, 1942, may sell under the provisions of this action without applying to OPA for a price, as would have been required under the general provisions of the General MPR, OPA said.

Committee Advises Controls Retained

Washington

• • • **The Steel Operations** and Metallurgical Industry Advisory Committee has suggested to WPB that present controls on components entering into steel production be maintained until rated orders drop to 85 pct of productive capacity. The committee listed pig iron, scrap, coke and elements entering into the production of alloy steels among the products on which government restrictions should be continued until the supply situation eases. The 85 pct barometer, committee members agreed, should be used only as a guide. Industry, they said, should have a chance to build up inventories before removing all controls on these products.

In reviewing the availability of elements entering into the production of alloy steels special attention was given to nickel oxide, a product produced from cuban ores. Steel operators were unanimous in their reports that the most efficient and effective use of nickel oxide was in the manufacture of the stainless steels containing nickel.

Experiences of the industry in the use of nickel oxide in the manufacture of open hearth steels were said to have shown that nickel recoveries have varied widely. One member reported that on eight heats charged into an open hearth furnace, recovery averaged only about 80 pct which he said, rendered the use of nickel oxide commercially unfeasible. Improvement was said to be practicable if packaging in metal containers could be instituted. Satisfactory results, it was pointed out, have been secured in electric furnace steel practice, and especially in the manufacture of the stainless steels where nickel recoveries have averaged 95 pct or better.

Penton Co. Publishes Hauck Steel Report

Cleveland

• • • **Steel expansion** For War, an official historical report prepared for the War Production Board by W. A. Hauck and which reveals heretofore unpublished and detailed facts about the steel industry has been printed by the Penton Publishing Co. on heavy-coated paper.

The publication, including 148 pictures plus charts and tables, may be obtained for $2 postpaid from the Penton Publishing Co., 1213 W. Third St., Cleveland 13, Ohio.

Much of the data in the book will be used shortly in hearings before Senator Joseph C. O'Mahoney's War Committee. Mr. Hauck notes that the steel industry has shifted geographically from the East and Midwest toward the West and Southwest. In addition he indicates there has been a shift in capacity from the larger to the smaller companies.

Carnegie-Illinois Lists New Extras and Deductions

Pittsburgh

• • • **Carnegie-Illinois** Steel Corp., this week issued a new list of extras and deductions on its U. S. S. electrical sheet and strip, replacing the list issued June 6, 1938. Standard extras and deductions are shown for the following Carnegie-Illinois items: field, armature, electrical, motor dynamo, and transformer grades, Nos. 72, 65, 58, and 52.

Hauck Goes to DPC

Washington

• • • **William A. Hauck,** chief, control branch, WPB Steel Division, has resigned to accept a position with DPC. He will assist in utilization and disposition of government steel plants and facilities.

Hinckley Says Terminations Can Balance Cancellations During This Year

Chicago

• • • **Settlement of war** contract termination claims will keep pace with cancellations during the balance of this year providing contractors file their claims promptly, Robert H. Hinckley, director, Office of Contract Settlement, told the Chicago Assn. of Commerce here recently.

"The settlement rate has been increased from about $800 million per month during the third quarter of last year to the current level of $1.6 billion per month," he said. "It is anticipated that the contracting agencies will be equipped to settle well above $2 billion per month of terminations by August or September of this year, providing contractors file their claims promptly. Thus unsettled load at the end of the year will not be much in excess of $9.5 billion, the level of terminations pending settlement on March 31, 1945.

Terminations of $27.5 billion through March 31 consisted of $19.6 billion of fixed price contracts and $7.9 billion of cost plus contracts. Of the fixed price terminations, $14.7 billion had been settled—75 pct of the total canceled. These fixed price settlements were settled for $674 million, or less than five pct of the canceled commitments, and after credits for property disposals and retentions, required the payment to contractors of $601 million. Of the cost plus terminations, only $3.3 billion out of $7.9 billion were settled, or 42 pct, due to more difficult determination of necessary payments.

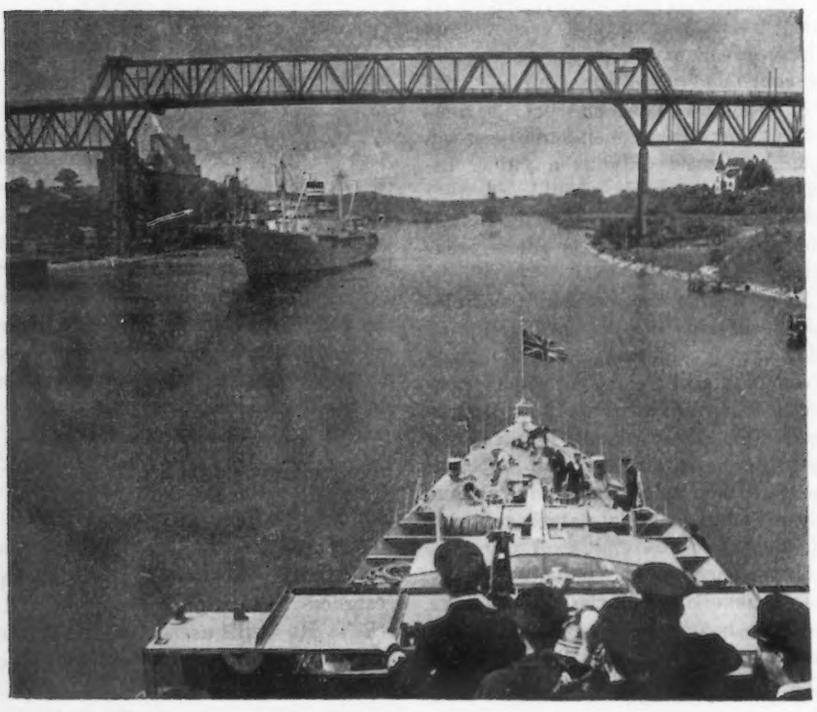
Terminations in April anticipating VE-Day totaled $1.8 billion, and in May $5.1 billion were canceled, he said. He anticipated June terminations would be about $3 billion, and assuming continuation of the war, the last six months of the year would bring an additional $10 billion of terminated commitments. He anticipated a total of $47 billions to the end of 1945 compared with less than $4 billions in terminations at the end of World War I.

Roger L. Putnam, deputy OCS director, said that the agency had set a goal to clear inventory of plants in which production had been terminated within ten days of the termination. He revealed that Army termination procedures were under survey with the idea of making them uniform or more compatible. Navy procedures also are under survey, he said, although these have not played a major part to date. He said that Army Ordnance plant clearance of inventory has been relatively quick because of decentralization.

Plant inventories affected by the 150,000 cancellations to date have been a relatively small clearance problem because of scarcity of materials and utilization in succeeding contracts. The principal emphasis has been on screening of requirements, but with the exception of the Navy whose production still is increasing, plant clearance of inventory will become a more important factor.

Removal of unwanted equipment, he said, has not been an important factor up until VE-Day and equipment just now is being released in quantity. He estimated that there was $3.5 billion worth of government equipment in plants, a large part of which would have to be moved. He pointed out that the equipment removal lends itself to pretermination and urged all contractors to work on pretermination plans as soon as possible.

ROAD BACK HOME: *H.M.S. ZEALOUS, one of Britain's newest wartime-built destroyers, approaches one of the bridges over the Kiel Canal on passage home from Copenhagen. German merchant shipping can also be seen in the river.*



Auto Firms Re-entry Into Sheet Market Revives Price Talk

New York

• • • **In the midst** of the steel industry's controversy with OPA over the alleged inequities of the recent price increase, some sideline observers recalling past steel market history are already wondering "when the next price break might occur." Apparently their curiosity has been aroused with the re-entry of the automobile industry into the steel sheet market.

In 1937 and in 1938 the heavy pressure of the automobile on steel prices enabled most of those companies to gain concessions ranging from $4 to $8 a ton on auto body sheets. Steel officials, however, are quick to point out that labor costs at that time were somewhat less than the current figure which is said to average more than $1.25 an hr. The average wage cost in the 1937-38 period was 86c an hr or less.

Furthermore, labor observers on the current question of price reductions are quick to point out that a strong union in the steel industry today is a bar to serious price reductions. Even in the automobile industry today there is no indication that automobile purchasing agents expect, for some time at least, the "bargain basement" sales on sheets which

broke out periodically in 1937 and in 1938.

The fundamental basis for price breaks on sheets in the past which have often spread to other products was said to be due to the tremendous capacity of the nation's wide strip mills plus the necessity for banking interest on loans which were originally used to purchase these mills. With the postwar era expected to be active with demand for long-neglected consumer desires as well as rehabilitation of European countries, it may be some time, according to steel observers, before these mills find themselves short on orders.

In addition to the expected demand for sheets, requirements for other steel products, such as hot rolled bars, structural shapes, plates and strip will probably be heavy enough to support a sellers' market for some time.

Steel observers believe that another possible deterrent to any nearby weakness in steel price structure is under cover drive by the steel union to maintain current take-home pay. Considerable activity by the union to have current wage rates raised to compensate for possible return to a 40-hr. week is anticipated.

Another factor which has some bearing on the steel price situation is the fact that many steel companies will be forced to lower their operating rate in order to bypass obsolete and high-cost equipment. Such a move which is bound to occur if history repeats itself, will have the effect of maintaining a sellers' market longer than the case would be if all available equipment were used.

Most consumers as well as market analysts are of the firm opinion that war orders, until the end of the Japanese War, will dictate the fulfillment of only a portion of civilian demand, while after the war pent-up demand both at home and abroad will hardly support a deflationary price movement.

R. C. Allen Gets New Post

Washington

• • • **R. C. Allen**, executive vice president, Oglebay, Norton & Co., Cleveland, has been appointed deputy vice chairman of the WPB Office of Metals and Minerals.

Mr. Allen's appointment marks his second connection with WPB. He came to Washington in June, 1940, as a member of the Advisory Commission of the Council of National Defense.

Cuts on Shell Components and Containers to Release Some Sheet Steel

Chicago

• • • **Reductions of approximately** $20 million per month in the production of medium artillery ammunition components were announced Monday by the Army following a two day meeting of Army and plant officials here last week. The cutbacks include storage cases, cartridge cases, containers, fuses, primers and boosters, and will become effective between now and Sept. 1.

The cuts in container storage case production in the Chicago Ordnance District, together with a previous cut, will mean that August production of shell containers and storage cases will be about 55 per cent below April levels.

It was estimated that approximately 7600 workers in 83 plants throughout the nation would be released.

Following are plants which will release from 100 to 250 workers between now and Sept. 1:

Air Cooled Motors, Syracuse, N. Y., 135, Bridgeport Brass Co., Indianapolis, Inc., 100, Bulova Watch Co., Philadelphia, 136, Chase Brass Co., Waterbury, Conn., 160, Commercial Controls Corp., Rochester, N. Y., 150, Dixie Metal Products, Bessemer, Ala., 206, Franklin Machine and Foundry, Providence, R. I. 170.

General Aircraft Equipment Co., South Norwalk, Conn. 150, General Outdoor Advertising Co., Jacksonville, Fla., 122, Grenada Industries, Grenada, Miss., 110, Harrison Sheet Steel Co., Chicago, 125, Heywood Wakefield Co., Gardner, Mass., 125, Jamestown Steel Partitions, Jamestown, N. Y., 100, Landis Mach. Co., St. Louis, 100.

Line Material Co., East Stroudsburg, Pa., 103, Martin and Schwartz, Inc., Salisbury, Md., 119, Mullins Mfg. Co., Warren, Ohio, 100, Multiplex Mfg. Co., Berwick, Pa., 214, National Lead Co., Granite City, Ill., 200, Newark Stove Co., Newark, Ohio, 170, Titan Metal Mfg. Co., Bellefonte, Pa., 100, Tracy Mfg. Co., Pittsburgh, 103.

Following are plants which are expected to release over 250 workers:

Elastic Stop Nut Corp., Lincoln, Neb., 670, Robertshaw Thermostat Co., Youngwood, Pa., 550, Scovill Mfg. Co. Waterbury Conn., 554, Sunbeam Electric Co., Evansville, Ind., 300, Supreme Knitting Machine Co., Brooklyn, N. Y., 295.

STAGING AREA: *Covering an area of over 10 sq. miles, one of the largest staging areas on the European continent is located 18 miles north of Marseille, France. The area is a city complete within itself where U. S. troops are processed for shipment to the Pacific for the final assault on Japan.*

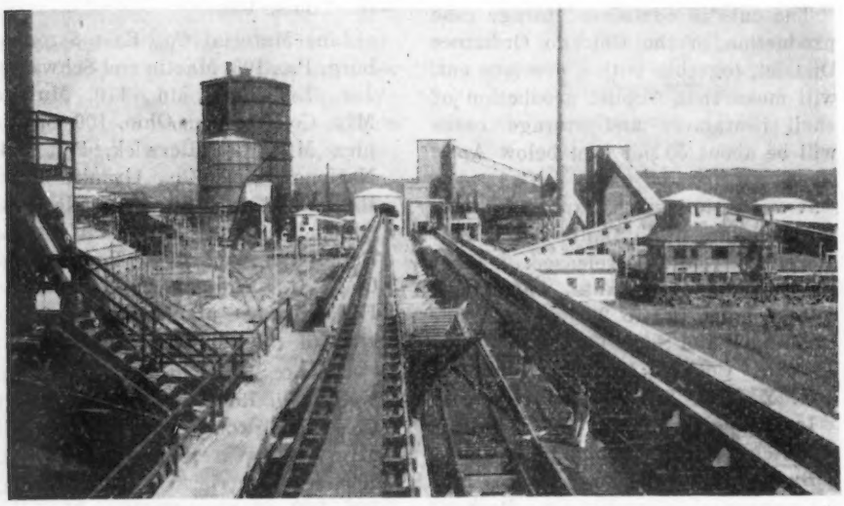
Brazil's New Steel Industry About Ready for Production

New York

By JOHN ANTHONY

• • • **Some of the richest** iron ore in the world is about to be exploited on a grand scale when the nationally-owned steel industry of Brazil goes into production this year. The plant, located at Volta Redonda in the state of Rio de Janeiro, has been under construction since 1941, at which time it was anticipated that initial production would take place in 1944. However, the United States at war has been unable to supply equipment on schedule and there were the difficulties of establishing a fully integrated steel plant in an agrarian country.

Recently, all plant engineering and design handled by Arthur G. McKee & Co., Cleveland, have been completed and the Brazilian National Steel Co. has transferred its office in the U. S. from Cleveland to New York City. It is estimated by Col. S. R. Oliveira, vice-president, that the byproduct coke plant which will include a battery of 55 ovens will go into production in August or September, the blast furnace in September or October, open-hearths in the latter part of 1945, and the blooming mill early in 1946.



ABOVE

VOLTA REDONDA: *Brazil's steel mill in May 1945. The blast furnace trestle, including the coke conveyor, is shown in the foreground. In the background, right, is the coke plant; left, are the gas holders.*

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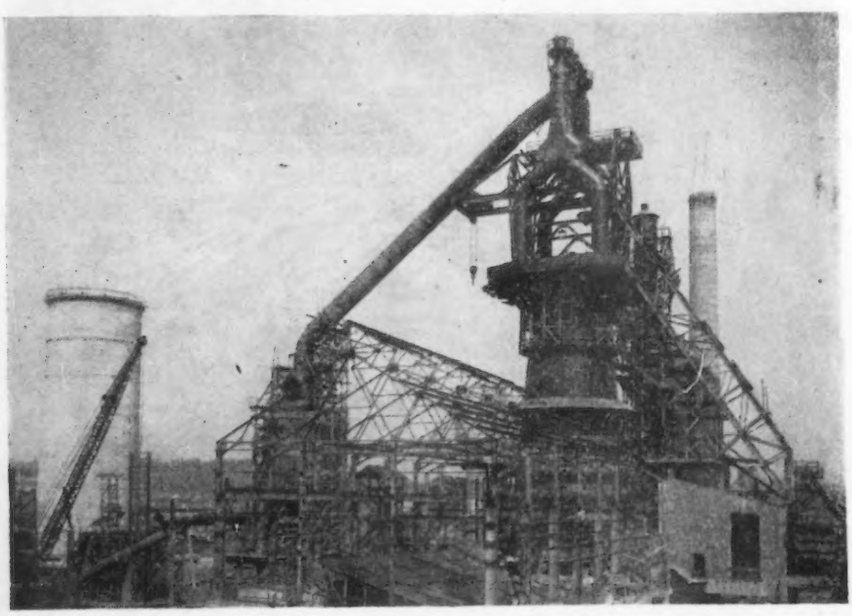
BELOW

BLAST FURNACE CONSTRUCTION: *View of furnace last August; now it is nearly ready for production.*



Brazil's per capita consumption of steel has always been small due to the high cost of steel imports and the very small scale home steel industry. A typical year's production, 1944, is 237,000 tons of pig iron from 24 small blast furnaces using charcoal fuel exclusively, 188,000 tons of ingot from openhearth production and 160,000 tons of finished steel. Foundry coke to the extent of 40,000 tons is produced annually. Relatively undeveloped industrially, Brazil's iron and steel imports have been very heavy in the finished steel categories. Under the impetus of war requirements, steel imports have been stepped up tremendously in 1944 as compared with 1943 and previous years. The following statistics show dollar values of iron and steel imports based on the exchange value of 5c per Cruzeiro:

	1944	1943
Bars, Structurals and Mesh	$4,945,850	$927,300
Angles and Ties	706,350	227,800
Sheet and Plate	7,562,700	2,475,000
Strip	2,422,650	1,237,950
Pig Iron	1,088,450	390,000
Barbed Wire	329,850	209,650
Bright and Galvanized Wire	2,204,000	559,750
Tinplate	7,367,400	6,274,650
Rails, Spikes, etc.	4,370,350	5,156,850
Pipe and Tubing	4,646,150	2,216,000
Miscellaneous	8,667,100	6,502,500
	$44,310,850	$26,177,450

Brazilian officials do not expect that within any foreseeable period the operation of the Volta Redonda mill will permit them to become a steel exporting nation. This plant has been designed to develop Brazil's resources of ore, coal and manganese, and provide steel at low cost to permit further industrialization of the nation. While imports of steel from North America may be expected to decline when this mill goes into production, the increase in imports of manufactured products containing steel and other metals should more than compensate for the difference.

The iron ore mines are only 240 miles by rail from the mill and it is estimated that the ore reserves represent approximately 25 pct of the world's reserves. The iron content

averages about 62 pct. Until the opening of the plant, the bulk of ore has been sold for consumption in the USA and in British Empire steel mills, as well as in the charcoal steel industry.

Brazilian limestone and dolomite will be quarried about 220 miles by rail away from the mill. Manganese ore is obtained near the iron ore deposits. The rich Brazilian manganese ore is now being imported in large quantities into the United States.

Coal is the least promising raw material for Volta Redonda production as its transportation will be costly and its quality is such as to require preparatory washing or enrichment by the addition of high-grade imported coking coals. The coal comes from the mines in the state of Santa Catharina to Laguna and Imbituba by rail, then 500 miles by boat to Rio de Janeiro, and then by rail to the mill.

Four blast furnaces are planned, and the one going into production in September will have an annual capacity of 350,000 tons if pig iron. The byproduct coke ovens will have a carbonizing capacity of 1500 tons of coal in 24 hr. Initial openhearth production of 256,000 tons of ingot per year is contemplated.

Rolling mill capacity for the first year's production is expected to reach the following net tonnages:

Angle bars and tie plates	70,000
Structurals and bar size shapes	20,000
Merchant bars	15,000
Plate	20,000
Sheet	15,000
Galvanized sheet	15,000
Tinplate	40,000

All these production figures are expected to be bettered with continuing domestic requirements following the first year's production.

Financing of the Volta Redonda plant involved a $45 million bank credit from the Export-Import Bank. In addition, an amount of about $50 million of Brazilian funds is being used in establishing the mill.

Plans New Spring Plant

Detroit

• • • **To produce the** new automobile springs which the company has announced will be part of its postwar manufacturing, the F. L. Jacobs Co. plans to build a new plant in Danville, Ill.

Output will probably begin at this plant in November, it was stated by Rex C. Jacobs, president, to produce automobile cushions, seat and back spring assemblies. Before the war the Jacobs Co. manufactured only precision automotive parts.

WPB Approves 948 New Reconversion Requests

Washington

• • • **Following its policy** of giving preference ratings for construction and equipment materials necessary for industrial reconversion, the War Production Board announced recently it had approved 948 new applications totaling $183,369,000 from April 1 through June 22, under Priorities Reg. 24 and Dir. 5 to Conservation Order L-41.

The previous summary, covering the period from April 1 through June 15, listed 754 applications approved, totaling $154,960,000.

At the close of business June 22, the automotive industry was still in the lead, with 231 applications approved to the total value of $124,967,000. Iron and steel products came next with 204 approved applications amounting to $20,980,000 and machinery, other than electrical, ranked third with 109 approved applications at a total valuation of $23,986,000.

Geographically, Michigan continued to retain its lead with a total of 245 approved applications valued at $96,-140,000, reflecting requests from the automotive industry.

DREAM AGE TOLEDO: *Emerging from the drawing boards of planning engineers is a master plan for the rebuilding of Toledo after the war that rivals any for completeness. One feature will be a midtown airport to be built on a sight now covered with marshes and tenements. Underground railways and motor tubes will give immediate access to the field.*

Industrial Briefs . . .

• EXPANDING — An extensive postwar building and research program is being planned for the Plastics Division of Reynolds Metals Co. at Gary, Ind., according to a recent announcement. This is expected to begin as soon as restrictions on building materials are lifted.

• GOVERNMENT MANUAL—"Establishing and Operating a Metal Working Shop," a 200-page book released by the Department of Commerce, is the first in a series of small business manuals prepared by the Bureau of Foreign and Domestic Commerce for the guidance of those who plan to establish enterprises of their own. The manual, formerly limited to men and women of the Armed forces, now is released for general use and may be obtained for 35c. from the Superintendent of Documents, U. S. Government Printing Office, Washington 25.

• SEAMLESS TUBE DATA—In order to make clear the difference in classes of seamless steel aircraft tubing, The Seamless Steel Tube Institute, Pittsburgh, Pa., has compiled a booklet entitled "Seamless Steel Alloy Aircraft Tubing." Also, a booklet containing weight tables on round seamless steel tubing has been prepared by Michigan Seamless Tube Co., South Lyon, Mich.

• CIVILIAN OUTPUT — Philco Corp. will resume production of household refrigerators in the quarter beginning July 1 in accordance with the WPB program for the industry, it was announced recently by John Ballantyne, president.

• SAFETY RECORD — The first company in Cleveland to be awarded the distinguished service "S" pennant by the National Safety Council for an outstanding safety record is the Bolt & Nut Division of Republic Steel Corp.

• FORGING TERMS — To aid users and buyers of forgings toward a better knowledge of forging practice, the Kropp Forge Co. has compiled a comprehensive list of forging terms with their correct definitions and published them in a 20-page illustrated booklet entitled "Glossary of Forging Terms." A copy may be obtained on request from the Kropp Forge Co., 5301 W. Roosevelt Road, Chicago 50, Ill.

• MEXICAN PLANT—Formation of Square D de Mexico, S.A., to manufacture electrical distributing and control equipment for the Mexican market is in process of completion, F. W. Magin, president of Square D Co., Detroit, announced recently. Square D de Mexico will be owned jointly by the United States company and prominent Mexican industrial leaders. Officers of the company will be residents of Mexico, and according to Mr. Magin a plant equipped with the latest type of American machinery will be built in Mexico City, D.F., as quickly as arrangements can be completed.

• MISSION TO MOSCOW—Three officials of the Timken Roller Bearing Co., William E. Umstattd, president; A. L. Bergstrom, vice-president in charge of engineering; and O. J. Horger, chief engineer of the railway division, have left for a business trip to Moscow. Mr. Umstattd said the purpose of the trip was to interest the Soviet Government in using Timken tapered roller bearings in a complete revamping of the Russian railway system and to offer technical assistance in plans for a plan to manufacture roller bearings.

• ACQUISITION — Barium Steel Corp. through its subsidiary, the Clyde Iron Works, Inc., Duluth, Minn., has acquired control of the Erie Bolt & Nut Co. of Erie, Pa.

Standards Association Changes Constitution For Postwar Activity

New York

• • • **Changes in the** Constitution of the American Standards Association that will enable it to meet more fully the needs of government and industry in the postwar period were announced recently by P. G. Agnew, secretary. The national trade, technical, and governmental groups that make up the American Standards Association have ratified these changes, the principal one of which will remove present restrictions limiting the work of ASA to those fields in which engineering methods apply. The organization will therefore be in a position to handle any standard or standardization project which is in the field of engineering, consumer goods or any other field that deserves national recognition.

Another change provides for specific mention of the consensus principle in the constitution. This principle, that all groups with an interest in a particular standard have a right to a voice in its development, has always been basic in ASA operations. However, it seemed wise to place additional emphasis upon it by incorporating it in the constitution, thus assuring cooperating bodies that the work will be carried out in accordance with their desires.

A third change provides for election to the board of directors of three members-at-large. At present all but the ex-officio members of the board are nominated in rotation by the member-bodies. The additional members-at-large will make it possible to enlist the services of outstanding persons from groups not otherwise represented, thus making the board still more broadly representative.

In making these changes in the constitution of the American Standards Association, the national trade, technical and governmental groups that constitute its basic membership restated their belief that the central force of the standardization movement should continue to spring from the organized industrial, professional and consumer groups with the full cooperation of the governmental agencies concerned.

Says Export Subsidies Program Will Menace American Industries

Boston

• • • **The recent adoption** by the United States of a program of export subsidies has interjected a dangerous factor in our foreign trade prospects, says Theodore A. Sumberg, economist in the Foreign Research Division, Federal Reserve Bank of New York, writing in the summer number of the *Harvard Business Review*, under the title "Menace of Export Subsidies."

"At no time in the past was there so much public sentiment as there now is that something must be done to reduce trade barriers," Mr. Sumberg says, and then proceeds to cast doubt on the ability of those interested in commercial policy reform to succeed in bringing about conditions of freer trade. The reformers "have usually attacked past trade evils while new and more ornery ones sprang up among them. They are continuing the same error. They are throwing their strength into efforts at world-wide tariff reduction, though the protective tariff is no longer the chief instrument of trade restriction. The more direct and effective methods of limiting imports by denying licenses to importers or refusing them requests for foreign exchange have replaced tariffs as the appropriate principal objects of commercial policy reform.

"But imports are not everything; the export side must also be reviewed in the light of liberal trade practices. As the war approaches its end and supplies for civilian use become more available, if we are not careful the wartime export controls which were set up deliberately to restrict export volumes may be pressed into service as instruments of export promotion. Or else new promotional devices may be set up; the governments of Canada and Great Britain, for instance, have recently expanded their export credit insurance facilities, Canada undertaking such action for the first time.

"Export subsidies are of course only another promotional scheme—but one of great trouble-making power. Though the United States has shied away from import quotas and exchange control, it may become the biggest malefactor in regard to export subsidies. Far from assisting American exports, such subsidies may seriously impair the widespread benefits the public expects from foreign trade after the war."

Mr. Sumberg calls attention to the fact that the export subsidy program has been "little noticed by the public. Authorized by the Surplus Property Act of October 1944, the program affects the export of all American farm commodities and products made thereof. The program is still in its early stages and has so far included only minor amounts of raw cotton and wheat exports; but, as goods become easier in the last stages of the war, much greater volumes will become available for subsidized shipment abroad. Then the trouble will begin."

"The easy retaliatory action open to other countries," Mr. Sumberg warns, "is one of the most serious features of the subsidy program. Any country can play the same game; the only limit is financial ability. Some countries, having more serious surpluses and less diversified economies than the United States, have more reason to take export subsidy action. The national well-being of foreign countries is in general more dependent on export trade than is that of the United States. Though the United States is the biggest exporter in the world, in no other modern country are exports so small a part of national output. This peculiar position of American exports calls for careful restraint on our part.

"One feature of the subsidy program will not escape American industrialists. The program uses United States Treasury funds to help foreign rivals of American industry. Under ordinary circumstances it may be true that in view of greater American technical efficiency American export manufacturers have too much concern about Britain outcompeting them, but there seems no reason deliberately to run the risk of offsetting this efficiency by charging rival foreign producers less than American manufacturers for the same raw materials."

Mr. Sumberg points out that "it is not too late to eliminate Section 21c, which stands alone in the Surplus Property Act and can be removed from it without damage to the balance of the measure. Apart from certain ironic references abroad to the 'liberalism' of American commercial policy, little harm has yet been done. But when nonwar supplies become somewhat easier, a greater volume of goods will be available under legislative instruction for subsidy shipment abroad.

Foreign Briefs . . .

• BRAZIL—A report to the Department of Commerce says that Brazil's new steel plant, the Volta Redonda, 90 miles northwest of Rio de Janeiro, is nearing completion though the time of starting operations remains to be announced. The plant, financed by an Import-Export Bank loan and built with American materials and with the collaboration of United States technicians, is designed to double Brazil's output. It is scheduled to produce annually 360,000 tons of coke, 300,000 tons of pig iron and 200,000 tons of plates and other rolled products. In order to have its own coal supply, the Companhia Siderurgica Nacional (National Steel Co.) has started coal mining at Tubarao, Santa Catarina.

• PERU—Wartime industrial projects in the Chimbote district of Peru include a large hydroelectric power station at Canon del Pato with a capacity of 125,000 kw. and the establishment of an iron and steel plant designed to produce 100,000 tons a year. When approval of the plans to build the iron and steel plant is granted, the United States will allocate $15,000,000 out of a credit of $25,000,000 opened by the Export Import Bank under the agreement made between this country and the Peruvian Government in April, 1942.

• CHINA—Mr. Ching Chan Wu, senior secretary of the Chinese Ministry of Economic Affairs, recently predicted that in steel alone China would eventually reach an annual production equal to that of Great Britain and Japan. According to a recent estimate, China now has an iron ore reserve of 3,000,000,000 tons. Reserves of some ferrous alloys are substantial, one deposit of manganese alone amounting to 20,000,000 tons. Ample supplies of coal and coking coal are now available.

Ruhr Bomb Damage Will Delay European Reconstruction by Months

New York

• • • Black skeletons of twisted steel raise their heads from a pile of masonry debris to mark the spot where once stood the mighty Ruhr industrial cities. In its very center, where stood the proud and haughty Krupp Works, the bronze statue of Alfred Krupp was blasted from its marble pedestal and now lies with a bullet hole in its head. An air target for Allied bombers for months and finally attacked by the Allied invading army as it crossed the Rhine, little is left in the great cities to compare with photographs taken a decade ago.

To those Americans who saw the Ruhr in its heyday it will doubtless be remembered as a vastly productive area, and even today in its damaged condition there is still evidence of its power. During an attack and clean-up of that portion of the Ruhr as represented by Duisburg, Essen, Gladbeck, Dortmund, Ruhrort and Hamborn, according to Col. John W. Wheeler, C. E., Corps Engineer, XVI Corps, Ninth U. S. Army, it was learned how the steel workers and soldiers had lived like rats in the second and third basements of the Krupp office during the final months before VE-Day. Expensive instruments, dirty dishes and bedding were found piled together indiscriminately. Great stores of light bulbs, office supplies, electrical equipment and machine tools were strewn about indicating a recent and hurried departure.

In the plants machines stood, some undamaged with unfinished munitions about them. The steel industry has been regimented so thoroughly that it carried on to the last possible moment prior to capture. The labor had included large numbers of captive slaves from Poland, Russia and France.

The Ruhr area turned out over 40 pct of German steel, or about 14,000,000 net tons of ingots. Employment averaged some 360,000, of which some 290,000 were males and 70,000 females. Of the males, about 190,000 were German and 100,000 foreigners; and of the females, about 47,000 were German and 23,000 foreigners.

The Ruhr industrial district can be compared to a certain degree to the American Calumet district. Taking Waukegan, North Chicago, Cicero, South Chicago, Hegwisch, Hammond, East Chicago, Whiting, Gary and Michigan City and putting them into an area of rectangular shape would create a district very similar to the Ruhr except for the lack of coal mines. While there is no single plant in the Ruhr as large as Carnegie-Illinois at Gary, the greater number of small plants combine to yield far more tonnage than is produced in the Calumet.

The Ruhr terrain which is not covered by industrial plants is fertile, and small-scale farming or large-scale gardening is carried on intensively around the plants. Family cows, in normal days are staked out on all available grass flats as once was common around Chicago.

The homes of steel workers and miners are not only well constructed but are cheerful and homelike in appearance. All are equipped with sanitary facilities, electricity and running water and compared favorably with the better homes of industrial work-

LEFT

• • *Street in a workers' estate in Hamborn.*

o o o

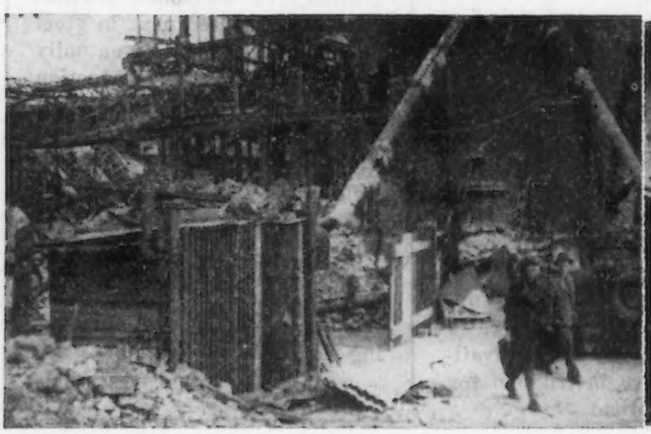
LOWER LEFT

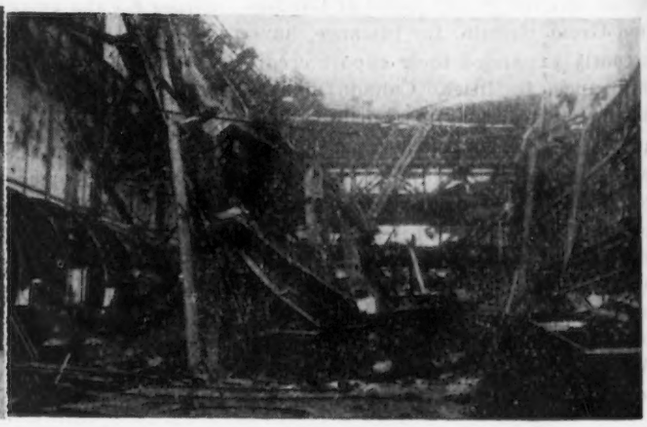
• • *Krupp's Administration Building after capture by U. S. forces.*

o o o

BELOW

• • *Building damage in one of the minor Krupp assembly units. This damage resulted from the heavy American daylight attacks of late October* 1944.





ers in the United States. The German people look well, combat activities having ceased, and they seem to take pleasure in their home activities.

The great mine properties are substantially constructed and well maintained, and are equipped with excellent bath facilities. Batteries of one hundred tile showers and lockers are a common sight in the majority of mines. As the mines were not damaged by explosives to the extent of the steel plants, the American troops are enjoying to the fullest the use of these showers. Dressing rooms provided for the miners gave them ample opportunity to remove all traces of the mining dust and grime before joining friends and family at the end of the day.

From remaining appearances, according to Col. Wheeler, the steel workers had equally good working conditions as had the miners. The plants seemed to have been modern in most respects. All labor-saving devices which are in use in the United States had their counterparts, if not replicas, in the steel plants in Germany although protective safeguards for workmen were not nearly as common as in America. With the exception of many horse-drawn vehicles in the mill towns instead of trucks so common in the United States, little difference can be noted.

The communications and public utilities of the mill towns were badly damaged, as were all highways and railway bridges. The enemy was particularly careful to destroy the great Rhine bridges as he retreated. Small bridges which covered the many canals in Germany were blasted, separated crossings of all highways were wrecked and in the first days of fighting in the Ruhr, all lines of communications were non-existent. The Allied combat engineers quickly remedied this situation with military bridging but it will take months and even years to re-establish normal civilian transportation and communications.

The rebuilding of the Ruhr cities presents an enormous problem, and undoubtedly will require decades. The operation of industries can be started fairly early on a piecemeal basis, but full operation will require some six months even if communications and shipping are immediately restored. However, in view of present conditions, it seems destined that complete restoration of industry will be postponed for many months to come.

Construction Projects Totalling 99,638 to Cost 15 Billions After War

New York

• • • **F. W. Dodge** Corp.'s organization's field staff by the end of May had spotted 99,638 specific construction projects contemplated for postwar execution in the thirty-seven states east of the Rocky Mountains according to Thomas S. Holden, president. The combined value of all projects is $15,746,202,000. Mr. Holden emphasized that the listings included specific projects only, and do not include announcements of general construction or expansion programs.

The Dodge executive declared that the information was obtained in continuous surveys from more than a million individuals, companies, institutions, and government agencies, and represents the cumulative and unduplicated reports of his field staff over a three-year period. While 99,638 projects are listed, the number of buildings involved is much greater, for many projects involve more than on structure, Mr. Holden said.

Analysis of the individual project reports shows, Mr. Holden said, that 33,104 jobs, estimated to cost $7,753,-138,000, have progressed to the design stage. It is these projects, he said, which will be advanced toward execution as rapidly as government regulations, and supplies of materials and manpower permit.

The remaining 66,534 projects, with an estimated cost of $7,993,064,000, constitute a backlog of specific contemplated projects, many of which will progress to design stage as rapidly as architects and engineers can find enough draftsmen to expand their currently limited planning activity, the Dodge executive declared.

"Full significance of these figures on contemplated construction projects is realized by comparing them with the contract records of peacetime years," Mr. Holden said.

"The dollar volume of design-stage work, exclusive of the backlog of additional contemplated projects, is 143 pct greater than the 37-state contract volume for 1938, is 118 pct greater than the 1939 contract volume, 93 pct greater than the 1940 volume, and 14 pct greater than the maximum peacetime contract volume established in 1928," Mr. Holden said.

The Dodge file of postwar projects contains a preponderance of public projects, Mr. Holden pointed out.

"Delays in construction revival will definitely not be due to any dearth of plans," Mr. Holden declared. "If only a moderate fraction of the public building and engineering projects that have been planned are ready to go ahead within the next 12 to 18 months, these, will constitute as large a demand as the industry can take.

ALUMINUM HOUSE: *Four sections of a prefabricated aluminum house, designed by the Aircraft Industries Research Organization on Housing, move down Oxford Street, London. The sections can be assembled in four hours.*

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Annual Report Covers Research Work on Coal For Fiscal Year 1944

Washington

The rapid expansion of steel and other premium-coal consuming industries has built up an urgent need for the development of new reserves and special purpose coals, says a Bureau of Mines report entitled "Annual Report of Research and Technologic Work on Coal for the Fiscal Year 1944." The report says that the bureau has investigated the conversion of marginal coal by preparatory treatment and the salvaging of coal now rejected because of impurities.

Prepared under the direction of Dr. A. C. Fieldner, chief of the bureau's fuels and explosives services, the report also describes coke research work and outlines developments in the recently-inaugurated synthetic liquid fuels program.

Continuing its efforts to find new sources of coking coal closer to the coke plants in the western and southern states, bureau representatives explored coal fields in New Mexico, Wyoming, Colorado and Alabama. Because of the acute fuel shortage in the northwest area, further investigations were made to determine minable reserves of coal in California, Nevada, Oregon and Washington.

To help meet mounting industrial requirements for better-grade metallurgical coke, Bureau of Mines engineers conducted a critical survey of the entire beehive coke industry and provided operators with technical information required for the production of this vitally needed fuel. As further aid in maintaining adequate reserves of coking coals, tests were conducted on the carbonizing, expanding and storage properties of coal from newly developed fields.

WPB Direction 70 To Reg. 1 Causes Concern

Washington

• • • **Concern is felt** by some WPB officials that Direction 70 to CMP Reg. 1 is restricting quantities of steel which might otherwise be available for unrated use in the third quarter. This is particularly true of sheet and strip which are expected to continue in tight supply at least until the latter part of August when the full impact of military cutbacks will be felt at the mill level.

Intended to keep reordering and re-

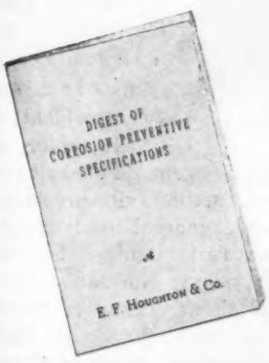
RIGHT NOW!

...Prepare to rust-protect your war machinery before storage

Either government-owned equipment or your own war machines will have to be carefully protected against corrosion before they can be moved out to make room for peace-time manufacturing.

Even though that great day may not have actually arrived, it's time to prepare for it, *right now,* so you will not have a last-minute shortage of the necessary materials. It will take time to collect the lumber, paper, containers and rust preventives needed to fulfill Uncle Sam's published packaging instructions.

That's a big job—one that will be made easier by a talk with the Houghton Man, who knows how others are handling it, preferred methods of application, and information on the various preventives we supply to meet these specifications. Our 70-year experience in fighting rust is at your service. E. F. HOUGHTON & CO., 303 W. Lehigh Ave., Philadelphia, and all principal cities.

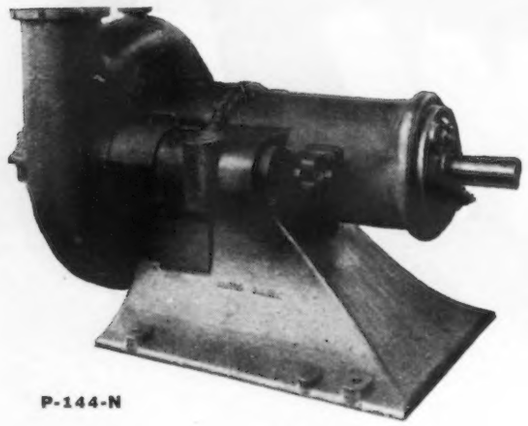


FREE—This pocket-size digest of the principal corrosion preventive "specs" for which Houghton supplies approved products.

Houghton's RUST Preventives

Pump Handles 130,000 Tons of Ore Tailings in a Year.....

An Amsco-Nagle 8" Type "T" frame 29 pump (P-144-N) was installed at a Minnesota mine to handle iron ore tailings. The original specifications called for 2,000 gallons per minute against a 50' head, but the pump is now handling 3,000 gallons per minute against a 75' head.



P-144-N

Last year the pump moved approximately 130,000 tons of tailings. When it was opened for inspection at the end of the year, the parts seemed good for another two months of operation, which would increase its output roughly to 175,000 tons.

Significant in this case is the nature of the material, which is very finely divided and definitely *not* in the class of materials which have a peen-hardening effect on manganese steel.

Work-hardening under impacts or heavy pressure, thus increasing abrasion resistance, is one of the most valuable characteristics of austenitic manganese steel, and has resulted in its use for a wide range of applications where severe wear is encountered. However, manganese steel, without this cold-working, is a good wear-resisting metal.

Where there *are* work-hardening conditions, the service ratio between manganese steel and other ferrous metals is so high that the other metals are usually out-classed. As the work-hardening factor diminishes, this disparity decreases but seldom to a point where manganese steel wearing parts will not pay for themselves, as they did in the case of the pump described.

Amsco-Nagle pumps welcome abrasive or corrosive applications. Send for Bulletin 940.

Send for Bulletin 941-W on Amsco Welding Rods

Amsco
AMERICAN MANGANESE STEEL DIVISION
Chicago Heights, Illinois
FOUNDRIES AT CHICAGO HEIGHTS, ILL.; NEW CASTLE, DEL.; DENVER, COLO.; OAKLAND, CALIF.; LOS ANGELES, CALIF.; ST. LOUIS, MO.
OFFICES IN PRINCIPAL CITIES

AMERICAN Brake Shoe COMPANY

scheduling incident to reconversion at a minimum, Direction 70 permits class A civilian type product manufacturers to continue use of material allotments after the related military contract has been canceled provided WPB is notified within 10 days after cancellation. The extent to which such allotments may be used is then determined by WPB and notice given the applicant within 10 days of receipt of his application.

Some producers, it is said, have taken advantage of the time lag of around 20 days and in some cases have withheld notice of cancellation for the full period allowed in order to secure some possible advantage in the procuring of steel.

Representatives of the steel industry, it is reported, are bringing pressure to bear on WPB in an attempt to eliminate the slow down in canceling steel orders and it is expected that policy change pertaining to this situation will be forthcoming very shortly.

Traffic Club Members Elect New Officers

Pittsburgh

• • • **At the annual election** of the Traffic Club of Pittsburgh recently, the following were elected officers: Charles F. McBride, general traffic manager, Pittsburgh Steel Co., president; Warner B. Shepherd, assistant general traffic manager, Aluminum Co. of America, first vice-president; C. G. Magruder, division freight agent, Pennsylvania Railroad Co., second vice-president; R. E. Rogers, general coal freight agent, New York Central System, third vice-president; Norman J. Conboy, general agent, Texas & Pacific Railway Co., secretary; S. B. Duff, traffic department, U. S. Steel Corp., treasurer; L. G. Hults, traffic manager, United Engineering & Foundry Co., F. G. Moore, traffic manager, Pittsburgh Plate Glass Co. (Columbia Chemical Division), M. C. Richards, general traffic manager, National Supply Co., A. C. Schweitzer, traffic manager, U. S. Steel Corp., all elected industrial governors; A. H. Farrar, freight traffic manager, Baltimore & Ohio Railroad Co., transportation governor.

C. F. McBride

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Convenient warehouse service

Detroit

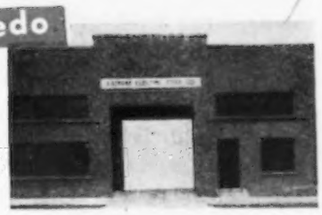
Hartford

Chicago

Philadelphia

For Reconversion Tool and Die Steels

Toledo



Cleveland

We'd like to say, "Pick up the 'phone and call the nearest Latrobe Warehouse for the steel you want." But these are days when war production still has first call, and conversion tool and die steels will not always be available until the final victory. When they are, Latrobe's seven warehouses, together with sales offices in principal cities, will be able to give you the best in prompt, efficient tool and die steel service.

Make it a habit to call Latrobe first.

Latrobe ELECTRIC STEEL COMPANY

S-4

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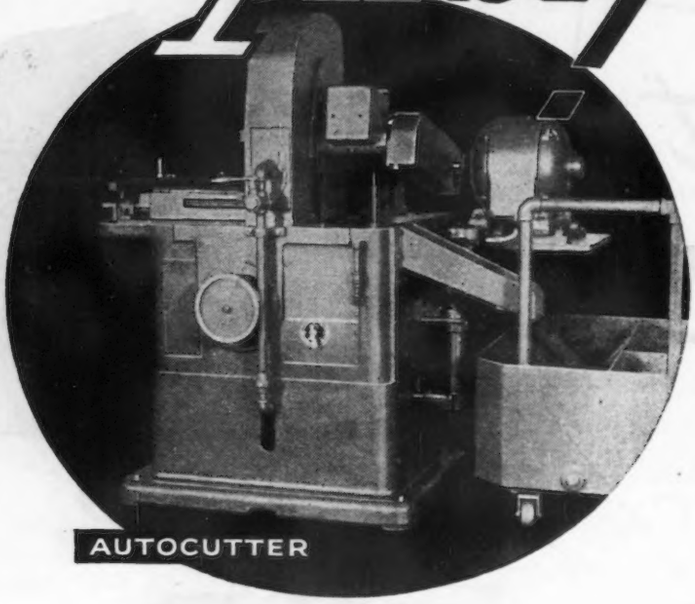

Yes, this **CAMPBELL "MODEL 700"** is the first *fully automatic* abrasive cutting machine ever built. Coming from **CAMPBELL**, manufacturers of the most complete range of abrasive cutters, that's big news.

This **"700"** is "first" another way. It is the opening announcement of **CAMPBELL'S** post-war program of development, based on wartime improvements all through the line. Other announcements will follow.

Maybe there's a way a **CAMPBELL ABRASIVE CUTTER** could speed up or economize your production. It's easy to find out.

WHY NOT DO THIS?

Write and tell us (1) the range of sizes, (2) kind of material, (3) length of cutoff pieces, (4) length of stock before cutting, (5) tolerance for length of cut pieces and (6) hourly production requirement. With this information, **CAMPBELL** engineers can recommend production procedure and work up cost sheets for you.

Campbell

ABRASIVE CUTTING MACHINES

ANDREW C. CAMPBELL DIVISION
BRIDGEPORT • CONNECTICUT
ALSO MAKERS OF A COMPLETE LINE OF NIBBLING MACHINES

ACCO
AMERICAN CHAIN & CABLE COMPANY, Inc.
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Army Cancellation Of Studebaker Contract Releases 5000 Workers

South Bend, Ind.

• • • **Contracts totaling** approximately $100 million for production of 2½ ton cargo trucks by Studebaker Corp. were cancelled recently by the Army, effective July 31.

The cancellations include 2½ ton trucks 6 x 4 and 6 x 6 type, with sets of spare parts. Forty-four thousand of these trucks had been scheduled to be produced between Aug. 1, 1945, and July 1, 1946. Approximately 5000 workers will be released between now and the termination date as their respective activities in the production process come to a halt. The termination also will directly affect 429 subcontractors, according to the company. The trucks received prominence in their widespread use by the Russian Army and have been described by Red Army representatives as the backbone of their entire transportation system.

Production of the M29C cargo carrier, known popularly as the Water Weasel, will continue at its present level.

Plane Plant Getting 48 Hour Work Week Exemption

Buffalo

• • • **The Bell Aircraft** Corp. has been granted an exemption from the 48-hr. work week at its Buffalo and Niagara Falls plants by the area WMC office. The company recently announced that an average 44-hr. week would be initiated at these plants by working 40 hr. one week and 48 the next. The CIO-United Auto Workers had asked that the company adopt a 40-hr. week with 48-hr. pay.

In Washington, the War Labor Board's airframe panel recommended denial of the union's demands for a union shop at the Bell plant here. Instead, the panel recommended renewal of maintenance of membership provisions in the contract between the company and the UAW.

Other suggestions by the panel included that the company have authority to change the number of shifts, starting time and the number of hours in a shift after consulting the union; and that checkoff provisions in the contract be renewed.

ARCOS STAINLEND ELECTRODES FOR ALTERNATING CURRENT WELDING

BUY STAINLEND ELECTRODES FOR:

1. Corrosion resistance of weld metal equal to the universally recognized Arcos Chromend grades.
2. The smooth and quiet arc characteristics of the Arcos titania coatings.
3. An attractive, low contour bead.
4. A slag easy to remove.
5. An all-position electrode in sizes 3/16" and smaller.
6. Suitable for DC as well as AC welding.

ARCOS

ARMY NAVY

★ ARCOS STAINLEND ELECTRODES AVAILABLE IN ALL POPULAR STAINLESS ANALYSES.

ARCOS CORPORATION · 304 GULF BLDG., PHILA. 2, PA.

Your Arcos Distributor is well informed. Your Arcos Distributor has Stock.

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Kingsport, Tenn.....Slip-Not Belting Corp.
Los Angeles, Calif.....Victor Equipment Co.
Milwaukee, Wis.....Machinery & Welder Corp.
Moline, Ill.....Machinery & Welder Corp.
Montreal, Canada..G.D.Peters&Co. of Canada, Ltd.
New Orleans 13, La...Gulf Welding Equip. Co.
New York, N. Y.....H. Boker & Co., Inc.
Oklahoma City, Okla..Hart Industrial Supply Co.
Pampa, Texas.....Hart Industrial Supply Co.
Pittsburgh, Pa.....Williams & Co., Inc
Portland, Ore.....J. E. Haseltine & Co.
Rochester, N. Y.....Welding Supply Co.
San Diego, Calif.....Victor Equipment Co.
San Francisco, Calif....Victor Equipment Co.
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Spokane, Wash.....J. E. Haseltine & Co.
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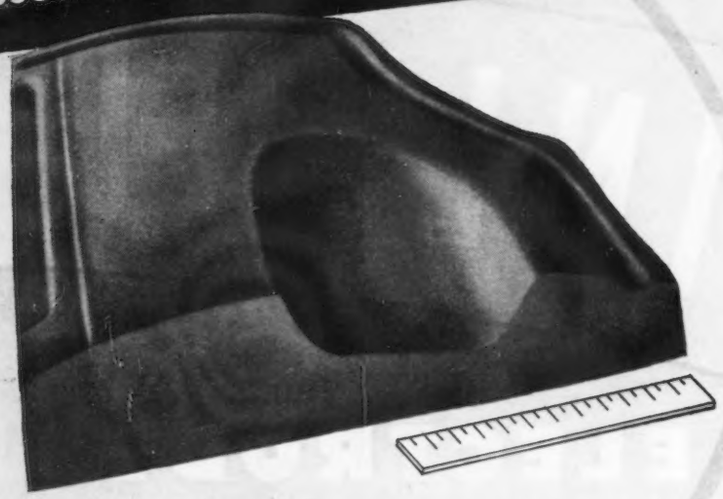
UNUSUAL CASTINGS FOR UNUSUAL SERVICE . .



ABSCO-MEEHANITE DIES
hold shape under hammer blows

Forming stainless steel for a prominent aircraft builder, this 2194-lb. female die part exemplifies Absco-Meehanite's ability to withstand repeated heavy blows under a large air hammer. It is one of many die castings which have been serving the same manufacturer for several years . . . turning out cowling parts with compound curves, short manifolds and other parts difficult to produce . . . making them from four different thicknesses of steel.

Used in place of less strong, less rigid metals, these cast-to-form dies eliminate excessive machining costs, and require only a light grind finish. Their graphite content gives them valuable self-lubricating characteristics which reduce wear. They retain a high polish in service.

Among the stainless steel products formed on Absco-Meehanite dies are those shown at the left. And the unusual properties which make Absco-Meehanite a good choice for forming dies have proved valuable in drawing and spinning dies also.

ABSCO-MEEHANITE PROPERTIES APPLYING TO THIS CASTING

✔1. Strength (Shear, Compressive, Tensile and Transverse)	5. Heat Resistance
✔2. Impact Resistance	6. Toughness
3. Corrosion Resistance	✔7. Rigidity
✔4. Wear Resistance	8. Machinability
	9. Pressure Tightness
	10. Vibration Absorption

Meehanite castings permit close control of physical properties for your specific application. Write for Meehanite Engineering Handbook

AMERICAN Brake Shoe COMPANY

BRAKE SHOE AND CASTINGS DIVISION
230 Park Ave., New York 17, N. Y.

4059

Soil Pipe and Fittings Ceiling Prices Raised

Washington

• • • **Ceiling prices of cast** iron soil pipe and fittings were increased $5 per ton at the mill level recently, effective June 14, the OPA has announced. The increase, which represents a rise of about 7¼ per cent over existing ceilings, was granted to meet the cost increase resulting from the 5c. per hr. wage increase granted to foundrymen in this industry, and raw materials cost increases.

Existing ceilings, which have been in effect since February 1942, have failed recently to meet cost of production, OPA said, and the new wage increase would work a hardship on producers. The increase granted is the minimum required by law to make prices fair and equitable, the agency said.

New ceilings, like existing prices, are f.o.b. Birmingham and are in terms of dollars and cents.

As a part of the same action, manufacturer-to-jobber sales, heretofore without specific coverage in the regulation, were given dollar-and-cent ceilings that spell out customary discounts given on this type of sale, OPA said. Manufacturer-to-user (or to installer) ceilings stated in the action are identical with ceilings on sales by jobbers to users or installers.

Tank Cutbacks Continue

Detroit

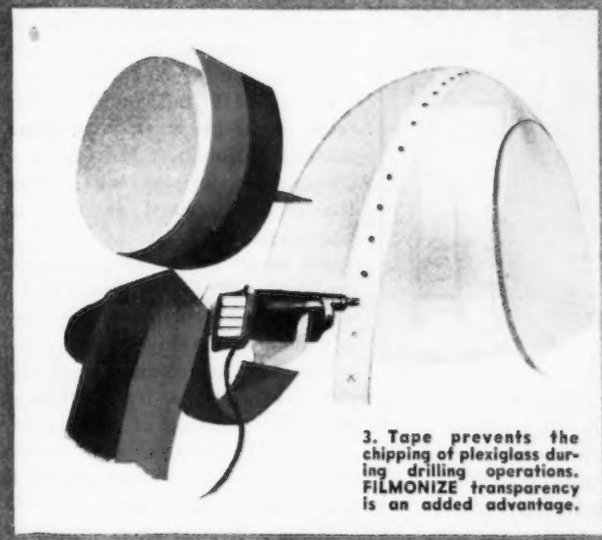
• • • **Cutbacks on** tank production are continuing here. Output on M-24 light tanks has been reduced at Cadillac Motor Car Division, with output scheduled progressively downward over a period of several months. This is the first time any effect of the end of the European War has been noted in the light tank field, although some weeks ago it resulted in broad scale cancellations of M-4 medium tanks.

These medium tank curtailments are expected to place the Lincoln plant of the Ford Motor Co. on a five-day week operating schedule for manufacture of engines. June output of GAF type engines, used in the General Pershing tanks, and the GAA type, which power the General Sherman tanks, has been reduced by 200 engines.

Employment totals are not being affected at Lincoln, which has been the only Ford unit operating on six-day schedule.

1. Tape holds subassembly parts together — in position for quick final assembly. Saves a lot of valuable man-hours.

2. Tape protects against moisture, dust, corrosion — and colored or printed tapes provide instant identification as well.



3. Tape prevents the chipping of plexiglass during drilling operations. FILMONIZE transparency is an added advantage.

4. FILMONIZE marks defects on castings in bright, easy-to-see colors that can't be smeared or rubbed off.

Tape up all your troubles

More and more factory bosses are saving time, cutting costs — by taping up those *!!:?x*! production bottlenecks with FILMONIZE Self-Sealing Tapes. Are you wise to FILMONIZE?

It's the tape with no "curl back"—no tangle—no waste. It's the tape that *stands up*—on or off the roll—under conditions that lots of tapes just can't take.

Ask your distributor about FILMONIZE. Let him tell you the hundred-and-one different uses for it. See the whole FILMONIZE line: Transparent Tapes, Colored and Multi-Colored Tapes, Printed Tapes, Riveting Tapes, Identifying Tapes, Splicing Tapes, Acetate Fibre Tapes, Metal Tapes, Specialty Tapes, Packaging Tapes. All in widths of ½" to 18"

P. S. — *If yours is an unusual problem, we'll put a tape engineer right on it. Just drop us a line.*

Filmonize

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INTERNATIONAL PLASTIC CORPORATION

Morristown **New Jersey**

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NOW AS FAMILIAR AND NECESSARY AS THE FIRST AID STATION

In the middle thirties salt tablets were a novel idea. Today practically all leading industrial plants wouldn't think of eliminating either salt tablets or first aid stations. Both are essential — the one to help prevent accidents, the other to repair them.

When workers sweat, their bodies lose essential salt. This loss causes Heat-Fag, inalertness, fatigue, heat prostrations. Accidents increase. Production goes down.

Morton's Salt Tablets at every drinking fountain provide an easy, simple, effective way to restore this vital salt lost through sweat. The cost is less than a cent a man per week.

In salt tablets, as with other grades and types of salt, Morton is the recognized leader. Order Morton's Salt Tablets and Dispensers from your distributor or directly from this advertisement. Write for free folder today . . . Morton Salt Company, 310 S. Michigan Ave., Chicago 4, Illinois.

MORTON'S DISPENSERS

They deliver salt tablets, one at a time, quickly, cleanly—no waste. Sanitary, easily filled, durable.

800 Tablet size - - $3.25

MORTON'S SALT TABLETS

Morton's Salt Tablets are available either plain or with dextrose.

Case of 9,000, 10-grain salt tablets - - - - - - $2.60

Salt Dextrose Tablets, case of 9,000 - - - - - $3.15

MORTON'S SALT TABLETS

Niagara Frontier Put In No. 2 Labor Class

Buffalo

• • • **The Buffalo industrial** area has been transferred from Group One (critical shortage) to Group Two by the War Manpower Commission, thereby permitting prime war contracts to be placed with plants of the district. The area includes Buffalo and its immediate suburbs, Niagara Falls, Tonawanda, North Tonawanda and Lockport. The order became effective June 22.

At the same time, Joseph D. Canty, WMC area director announced relaxation of the Controlled Referral Plan to permit 66 top priority war plants which are behind schedules to hire men at their shop gates who are holders of statements of availability.

Under the relaxed controls, plants may request individual exemptions from the 48-hr. work week order with the stipulation that Mr. Canty, before making the decision, will confer with the union involved as well as the management.

All workers deemed unsuited or unqualified for heavy industrial work will receive open referral cards, permitting any employer to hire them.

Women are released from the employment ceilings, irrespective of the essentiality rating of the plants. This step was taken to enable women laid off recently by aircraft plants to obtain work more easily.

Women in war jobs, however, are not allowed to leave them for non-essential work.

Foreign workers and prisoners of war are to be withdrawn as soon as the labor market permits.

Some Steel Surplus on Sale

Cleveland

• • • **Surplus steel and** some of its products tiptoed into the market this week, when it was learned that more than $2,000,000 worth of the metal will soon be put on sale.

While the tonnages involved are not made public, making the obvious deduction from the amount of cash involved, it may be safely assumed that the quantity is insufficient to affect the market.

RFC's local disposing loan agency has charge of the sale, and the listing is as follows:

Carbon and alloy billets, blooms and slabs	$160,000
Hot and cold rolled strip	409,000
Hot and cold rolled bars	543,000
Steel tubing	102,000
Wire rope and cable	205,000
Music wire	324,000
Misc. wire	146,000
Hot and cold rolled plates	77,000

How Military Vehicles Perform Described To Automotive Engineers

Detroit

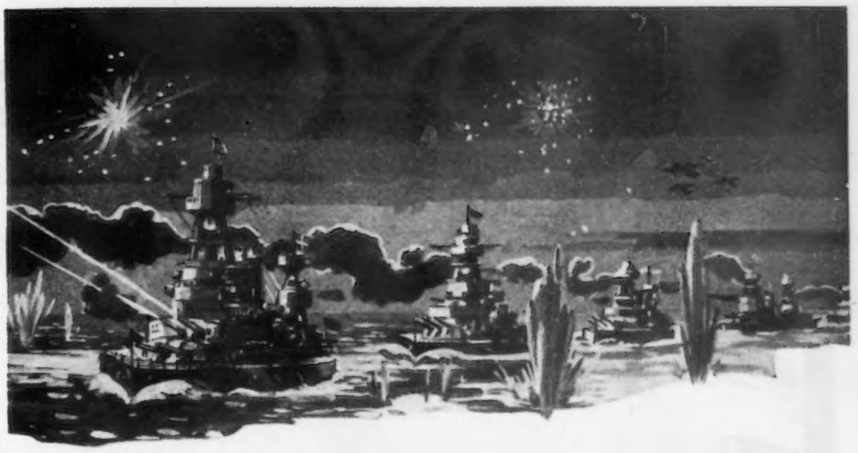
• • • **Reports on war products occupied a regional meeting of the Society of Automotive Engineers held here last week.**

Charles L. McCuen, vice-president in charge of engineering of General Motors Corp., praised the engineers for their joint contribution to war materiel, and predicted that so complete had been the merging of their ideas that probably several years might go by before automobiles of different companies would possess unique design features.

Ordnance officers discussed the performance of military vehicles in war theatres. Lieut. Col. E. H. Holtzkemper stated that as early as last September the European theatre of operations had received approximately 210,000 trucks, 99,000 trailers, 7600 semi-trailers, 4000 motorcycles and 550 passenger cars. Maj. A. E. Cleveland, describing automotive requirements of the South Pacific theatre, said the greatest needs were waterproof and mudproof brakes, permanent type fording equipment, increased cross-country mud ability for wheeled vehicles, more driver comfort (including improved ride, improved seats, and improved cab weather proofing), "A" frames readily attachable to cargo vehicles equipped with which to assist in the unloading of cargo, and, finally, a means of readily attaching pontoons to light vehicles for transporting them across rivers.

Reporting on rubber parts experience in Europe and the Mediterranean, Maj. J. J. Robson stated that rubber tires must be made stronger for war uses, that synthetic rubber has generally been very successful in combat, that further improvement is needed in larger synthetic tires, and that rubber tracks with a built-in traction bar are preferred for European fighting conditions.

Two technical papers at the morning session dealt with silicones, presented by W. T. Eveleth of General Electric, and with electron microscopic investigations of surface structures, presented by Dr. Robert D. Heidenreich of Dow Chemical Co.



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Just as the armor plate protects the battleship against enemy attacks, so a 20% ply of solid stainless bonded to mild steel gives perfect protection against corrosion.

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United States Potash Co.
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and many others

In most installations, protection is needed only on the contact side. Why pay for more stainless than you need?

As makers of both Ingersoll Solid Stainless Steel and IngAclad Stainless-Clad Steel, we will be glad to have our Engineers advise you without prejudice, to give you the utmost stainless protection at a minimum of cost.

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Borg-Warner Corporation
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FOR PRODUCTION

SHORT-CUTS

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Many times that suggestion is a first step toward product improvement, production short-cuts, lower costs. **PAGE** often makes the suggestion—prepares a recommendation—provides the wire; round, flat or specially shaped.

In addition to various analyses of stainless steel, **PAGE** offers wire of high and low carbon steels, Armco ingot iron and special alloys in a wide range of tempers and finishes; packaged in coils or straight lengths to meet your requirements.

PAGE offers you the benefit of many years of research and experience. If you have any production problem that might be solved by the use of wire, it will pay you to

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ACCO

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PAGE STEEL AND WIRE DIVISION
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TRADE MARK

Sweden Seeking New Pig Iron Production Methods Due to Costs

New York

• • • **A great effort** is being made in Sweden at the present time to develop new iron production methods due to the preponderant importance of the cost of raw materials and fuel in the ultimate costs of the product. According to the *Foreign Commerce Weekly* standard practice in Sweden under raw materials and fuel have been responsible for 80 per cent of costs, on coke pig iron, and for charcoal iron costs have been even higher.

The use of charcoal fuel maintained the quality of Swedish pig iron but greatly restricted volume of production. The low compressive strength of charcoal limits the height of stock column which can be attained in a blast furnce when this fuel is used. This has retarded the increase of capacity of charcoal blast furnaces in the past and continues to restrict the size of units generally employed—a very important factor affecting the supply of the domestic market with commercial grade steel of home production at present.

As late as 1833 the average output of the Swedish blast furnace was less than 3 metric tons per operating day. With the adoption, at that time, of the English hot blast method, using stack gases to heat the air and sinter the ore, furnace capacities increased. The average daily output was 6.68 tons for the period 1861-65, 13.81 tons in 1900, 21.35 in 1915, and 32.24 in 1939.

The use of coke as blast furnace fuel in Sweden commenced on a small scale at some steel plants shortly after the turn of the century. Coke pig is used mostly for commercial steel production, though some high grade steel has been made from it. The only manufacturer of coke pig iron for sale is Oxelösunds Järnverks AB, but the Domnarvet plant of Stora Kopparbergs Bargslags AB, produces coke pig for "home" use. The average coke unit is very small, by world standards, though unit production far exceeds that of charcoal blast furnaces. Total production of 253,625 metric tons in 1939 is relatively large. In 1936 average output, per furnace per day in blast, was 173.71 metric tons, and in 1939 the average was 145.26 tons. Some units have a capacity of 200 metric tons per day.

Grängesberg high phosphorus ores are largely, but not exclusively, used in coke blast furnaces. They are par-

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DEEP DRAWING QUALITY, Superior Long Terne steel sheets have a special analysis, open hearth steel base, tempered for accurate forming. Their lead-tin alloy coating provides self-lubrication for die work, and an excellent surface for paints and synthetic enamels.

Now widely used in war production, Superior Long Terne is fabricated into gas tanks for jeeps, ammunition cases, containers and many other parts and products. It also is used extensively in heating and ventilating equipment, farm machinery, and in other war-essential applications. Long Terne is one of a line of Superior sheets made to meet particular needs especially well. Write for more information about Long Terne and other Superior steel sheets.

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After careful inspection, a mark similar to the above is stamped on each sheet of Superior Long Terne. It is an identification and assurance of quality.

THE **SUPERIOR** SHEET STEEL COMPANY - *CANTON, OHIO*

PRODUCERS OF STEEL SHEETS, including SUPERIOR Galvanized, Tite and Extra Tite Coat Galvanized, CHECKERCOAT, LASTI-KOTE, COPPERIOR (copper steel base), SUPERIOR Galvannealed, SUPER METAL, SUPERIOR Long Ternes (drawing quality), Hot Rolled Annealed, Hot Rolled Annealed Pickled, Pickled Blue, Deoxidized, and Standard Types of Galvanized Formed Roofing.

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WITH LOW MAINTENANCE COST
provided by these

EUCLID CRANES

WE CAN DELIVER
a limited number of 5 to 10 ton cranes in 60 to 90 days

With an impressive percentage of installations in the principal heavy industries, EUCLID CRANES are generally accepted for efficient handling of material.

This recognition has been attained through many years of consistently satisfactory performance. Once a Euclid Crane is installed future installations generally bear the same name. And in many plants Euclid Cranes and Hoists are standard equipment.

Operations get quick response to every demand. Maintenance men are impressed with the speed and ease with which Euclid equipment can be kept in top operating condition. Results are apparent, too, in low costs of operation and maintenance.

THE EUCLID CRANE & HOIST CO.
1361 CHARDON RD., EUCLID, OHIO

ticularly important to Domnarvet, the largest producer of steel of commercial grade (apparently basic Bessemer steel). Oxelösund uses other ores as well, producing foundry pig, pig bar malleable cast iron, open hearth pig and pig for electrosteel, with phosphorus content ranging from 1.80 per cent to 0.035 per cent.

The quantity of charcoal consumed in ordinary blast furnaces in Sweden varies considerably, according to ore used, character of product, and other factors. In 1939 average consumption was 50.7 hectoliters per ton of pig produced, and for 1938 it was 51.5 hectoliters. Methods of fuel measurement also affect results, and the figures given by individual plants are often far from being in agreement with those from other plants. Thus in 1939 one prominent firm reported a consumption per ton of pig of 45.5 hectoliters, a small firm, specializing in foundry pig, used 65, and another 45 hectoliters.

Blast furnace charcoal may be produced from the forests of the company, purchased by the company from local producers, or purchased in northern Sweden. The rail haul involved in the last case greatly increases costs. The five counties in which most blast furnaces are located were responsible for 89 per cent of Sweden's charcoal consumption during the period 1933-37, and produced 61.1 per cent of the charcoal supply. While the average cost of the charcoal consumed in the iron and steel industry in 1939 was 1.22 crowns per hectoliter, prices ranged from 0.88 crown to 1.55 crowns. The fixed wartime prices of charcoal are of course much higher.

The average consumption of coke in blast furnaces in Sweden was 790 kilograms per ton in 1939 and 820 kilograms in 1938.

Domestic coals do not give coke suitable metallurgical use and wartime fuel cost increases have been a serious factor.

A desire to conserve wood resources led to the design and adoption in 1910 of the "Elektrometall" type of electric furnace. These, for the most part, use charcoal as a reducing agent, though coke breeze can be used. Electric energy is the main source of heat. The fact that charcoal dust can be employed is a favorable factor but current consumption is so high that low cost current is essential to their economical operation. Their capacity average from 35 to 45 metric tons per day for all units. Their quantitative advantage over regular charcoal blast furnaces appears to be due to opera-

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SEMISILICA BRICKS

DURATION OF HEAT AFFECTS REFRACTORIES

Following statements are based on temperature range from 2200° F to 2700° F.

SHORT DURATIONS OF HEAT

Furnaces with daily or shorter firing cycles usually require a good clay or super duty brick.

MODERATE DURATIONS OF HEAT

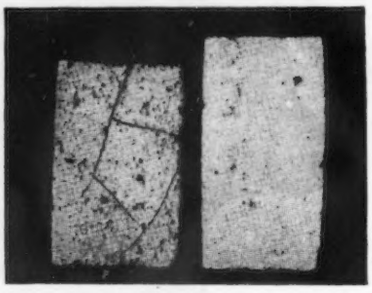
Furnaces with firing cycles of days, weeks or months require refractories which will not vitrify, shrink or spall, from the prolonged heats.

RM SEMISILICA BRICKS are made for this service. The picture at the right shows the results of 24 hours at 2650° F. on a First Quality Clay Brick and the almost unaffected RM.

LONG DURATIONS OF HEAT

Furnaces, intended to be run continuously can safely be lined with RM SEMISILICA BRICKS, provided the face temperature of the lining is below 2700° F. While silica bricks are ideal for continuous heats, a furnace may have to be shut down, which is hard on Silica Bricks, but RM SEMISILICA BRICKS take it easily.

Note. Some slags and gases attack refractories, so if in doubt, please ask or write for recommendation for your furnaces.



Compression, vitrification and spalling of First Quality Clay Brick, and relatively unaffected RM Semisilica brick after a run of 24 hours under heat and load.

In STEEL MILLS:

For Heating, Reheating, Annealing and Heat Treating Furnaces, OH Regenerators, Blast Furnace Stoves, Soaking Pits, etc. In the roofs, where spalling failure is most prevalent, they perform their greatest service.

In MANY INDUSTRIES:

Such as Chemical, Ceramic, Zinc Smelting and other industries where continuous heats in the temperature range of RM's are required for their processes.

RICHARD C. REMMEY SON CO.

PHILADELPHIA 37, PA.

REMMEY

tion on mixed charcoal and coke in some units, which reach an average daily production of more than 60 metric tons. Their average period of operation per annum appears to be higher than that of ordinary charcoal blast furnaces, and a maximum of nearly 7500 hr. or 312 days, is said to be feasible.

A characteristic design of this type of furnace (at Hagfors plant of Uddeholm AB.) consists of six electrode arc furnace, which takes the place of the hearth of an ordinary blast furnace, and which is surmounted by a stack very similar in section to the ordinary blast furnace. Early designs had a downcomer and the hot blast was applied as in ordinary blast furnace practice. It appears that no blast furnace is used in current practice with "Elektrometall" type of furnace, since it is claimed that absence of blast gives a lower gas content in the pig. The "off" gases are, however, recirculated through the furnace, and assist reduction. It is also said that the electro pig iron from this type of furnace is more uniform in quality and is easier to melt in the open hearth furnace than ordinary charcoal pig iron. Since the quantity of charcoal or coke in the charge is relatively small, the absorption of phosphorus and sulphur from fuel by the metal is slight.

Charcoal consumption per ton of pig iron produced is said to range from 330 to 350 kilograms. The average for 1939 was 28 hectoliters of charcoal, which compares with 50.7 hectoliters for ordinary charcoal blast furnaces. The 1939 charcoal figure for electric "shaft" furnaces is based on quantities derived from the volume of arriving cars; in 1935, when quantities were taken after dumping into storage, the consumption per ton of pig was computed at 22.7 hectoliters.

Current consumption in that year averaged 2500 kwh per ton of pig, though it is said that a rate as low as 2200 kwh can be reached by using sintered ore. Electrode consumption is about 7 kilograms per ton of pig.

By 1933 there were four furnaces of this type, of about 6500 kilowatts at the Domnarvet plant in Kopparberg Co. and four furnaces from 3500 to 4000 kilowatts at the Uddenholm Co.'s Hagfors plant in Värmland County. Uddeholm had five such units in use in 1939. Apparently other types of electric furnace are now of more interest to the Swedish industry. The two electric shaft furnaces at Porjus, Norrbotten County are no longer serviceable, and it was found

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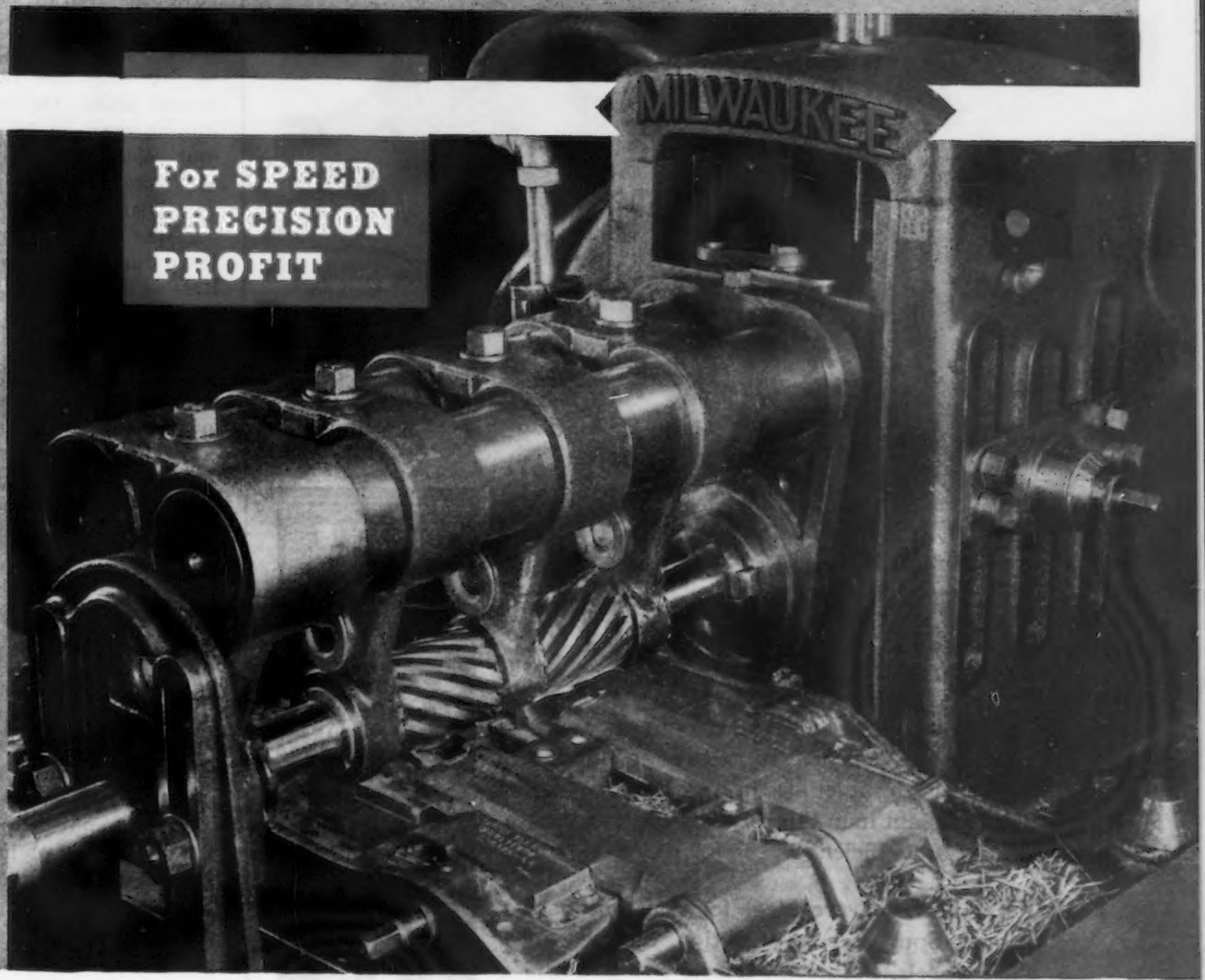


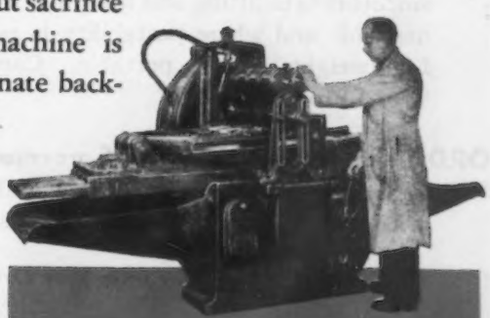
This heavy contour milling operation on a 1248 Milwaukee Simplex Milling Machine illustrates the rigidity of the machine itself. Using a rise and fall fixture the helical plain milling cutters removed ⅛ inch to 3/16 inches of stock from a steel forging. Ample cutter support is provided by the outer arm brace and the four arbor supports.

Often called "production type milling machines", the Milwaukee Simplex Series machines are designed for strength, compactness, and rigidity to withstand the strain of continuous quantity production.

Spindle construction is such as to provide greater range without sacrifice of rigidity. Basically designed for climb milling, this machine is equipped with an adjustable nut and ground screw to eliminate backlash in both directions of the table. Workpieces, ordinarily difficult to hold, are milled at faster feeds, with smoother finish and increased cutter life.

Write for new descriptive Bulletin B20 giving complete details on the Milwaukee Simplex and Duplex Series of Milling Machines.

Over-all view of the Milwaukee Simplex machine used on the above milling operations.



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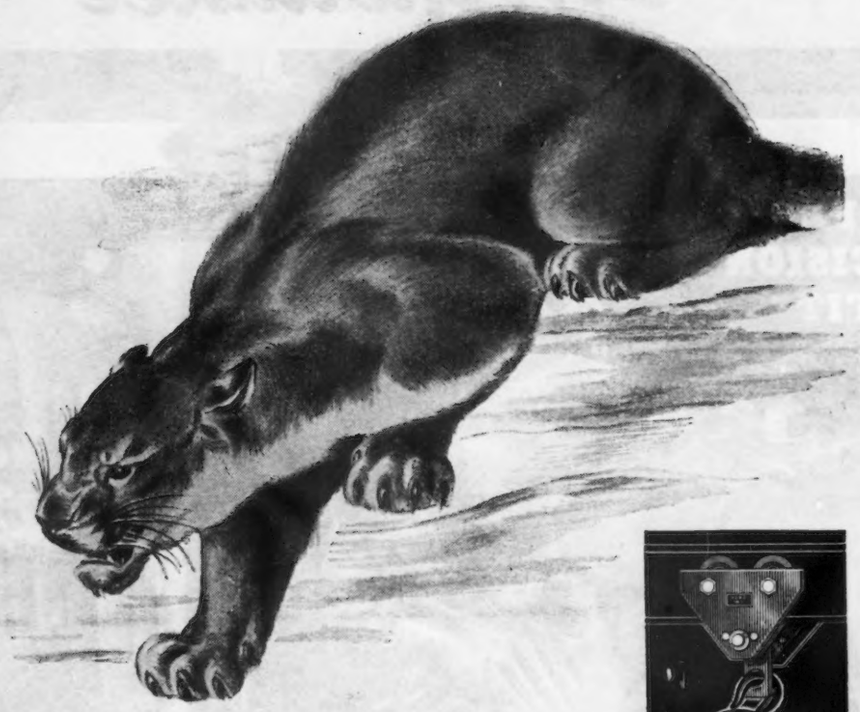

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FORD TRIBLOCS are ideal for constant hard usage. Spur gear construction, ball-bearing load wheels, both high tensile strength and elasticity in load chain, and many other features assure enduring efficiency. Capacities: ¼ to 40 tons.

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preferable to establish a Tysland-Hole pig iron plant at Svartön, Lulea, rather than repair and restore them during the present war.

Electric furnaces of various types, other than the shaft (Elektrometall), have been used for pig iron production in Sweden, for many years. In 1917 there were seven such furnaces, two of fair size, the rest small experimental units. Output was 9266 tons for the year. In 1939 there were only four electric furnaces, other than Elektrometall type operating 522 days in all, and only 4289 metric tons of pig was produced by them. Two of these furnaces were of the Tysland-Hole ("Spigerverk") type of 6500 kva and 12,000 kva capacity, respectively.

However, late in 1943, an important electric furnace plant, the government-owned Norrbottens Järnverks AB., situated on the island of Svartön, near Lulea, Baltic export point for Lapland ore, began operations. There are at present two Tysland-Hole furnace units. Ore is obtained from the Lapland fields and coke is used as a reducing agent though charcoal could, no doubt, be easily substituted. The present capacity of the plant is about 60,000 metric tons per annum, it is believed, but an extension is being discussed. The product replaces foreign pig. The foundry grade finds a ready market, despite high prices, but the open hearth grade is not thus far of interest to central Swedish steel plants.

The Tysland-Hole is a closed three-phase arc type, using 3 Söderberg continuous electrodes, in line or placed in a triangle. The electrodes run comparatively deep into the bath and can operate with 175 volts between them, resulting in relatively high furnace temperature.

One of the inventors claims the following values for the Tysland-Hole furnace. Lump ore, briquets or sinter, as well as purple ore, can be used. Sulphur removal is good and sulphur content in the pig iron, can easily be brought down to 0.03 per cent. At Imatra, Finland, maxima of 0.020 phosphorus and 0.010 sulphur can be reached.

Coke is the preferred reducing agent. Metallurgical coke, however, is not necessary, as gas coke has been found to be satisfactory. Charcoal also can be used. Lime ferrite has been found to be a better flux than limestone.

Current consumption per metric ton of pig, using coke, is from 2400 to 2600 kwh for steel furnace pig and

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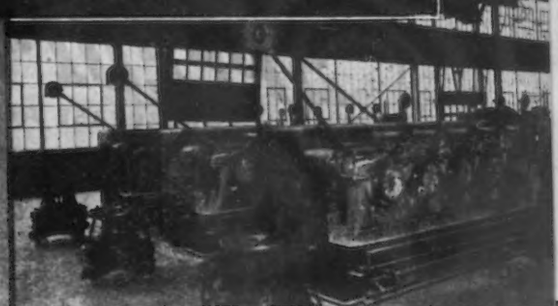

OUT OUR WAY

WHY, THIS IS SO LIGHT AN' CLEAN THAT I WOULDN'T MIND WORKING HERE MYSELF! I ALWAYS THOUGHT SHOPS WERE TERRIBLY DIRTY, OILY, GREASY PLACES!
THEY WERE, LADY-- BUT THAT WAS BEFORE SPEEDI-DRI!
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SPEEDI-DRI is a quadruple-threat for taking up grease and oil . . . it saves man-power, time, money, and the lives and limbs of employees.

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If you're spending too much man-power and money on floor-cleaning, let us show you what SPEEDI-DRI can do for you. No gangs of trained men, no costly machines, no inflammable solvents or dangerous caustics, no back-breaking scrubbing. Just spread a carpet of SPEEDI-DRI on the dirty floors; then sweep up with an ordinary broom. Floors will be bright, bone-dry, non-skid.

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SPEEDI-DRI
OIL AND GREASE ABSORBENT

up to 3000 kwh for high silicon foundry pig. Electrode consumption is from 8 to 10 kilograms per ton. With charcoal, consumption of energy and electrodes is less. About 400 kilograms of the reducing agent is required per ton. Coke and coke breeze are usually employed in equal parts in Sweden, it is said.

About 650 cubic meters of gases are produced per ton of pig output. Hydrogen and carbon monoxide constitute about 80 per cent of these gases but they have little or no part in the reduction process.

The pig iron rating of the two earlier Tysland-Hole furnaces in Sweden is not known exactly. A 10,000 kw., 12,000 kva furnace in Finland produced 90 to 100 metric tons per day, the 6000 kva unit at Oslo is understood to produce about 15,000 tons per year.

Installations of this type of furnace made before 1939 were:

		Kilovolt-ampere
Norway	"Spigerverk"	1 at 6,000
	"Bremanger"	1 at 9,000
Sweden	.....	1 at 6,500
	.....	1 at 12,000
Finland, "Imatra"		1 at 12,000
Japan (under construction) ...		2 at 7,500
Italy (planned)		several at 12,000

The pig iron production in Sweden is graded in a variety of ways, with some overlapping. The most general classifications, on the basis of reducing agent used, are: Charcoal pig iron, the higher grade, used for a variety of purposes, and coke pig iron, principally used in the production of commercial steel, but some of which is classed as a high grade material. Another method of classification is based on the type of furnace used in reduction, as well as on the reducing agent employed.

Commercially, pig iron is offered in the present classifications, which for the most part follow the statistical classifications in a general way only:

Charcoal Pig	*Coke Pig*
Lancashire (wrought iron)	Malleable casting
Bessemer	Foundry
Open-hearth	Open-hearth
Electro	
Granular	
Foundry	
Malleable casting pig	
Export	

The pig iron which was produced at Aminne Bruk (Jönkëping County) from high phosphorus limonite until about 1936 was a very high grade charcoal foundry pig of about 1.2 per cent P. The quality was attributed to the relatively cold blast employed.

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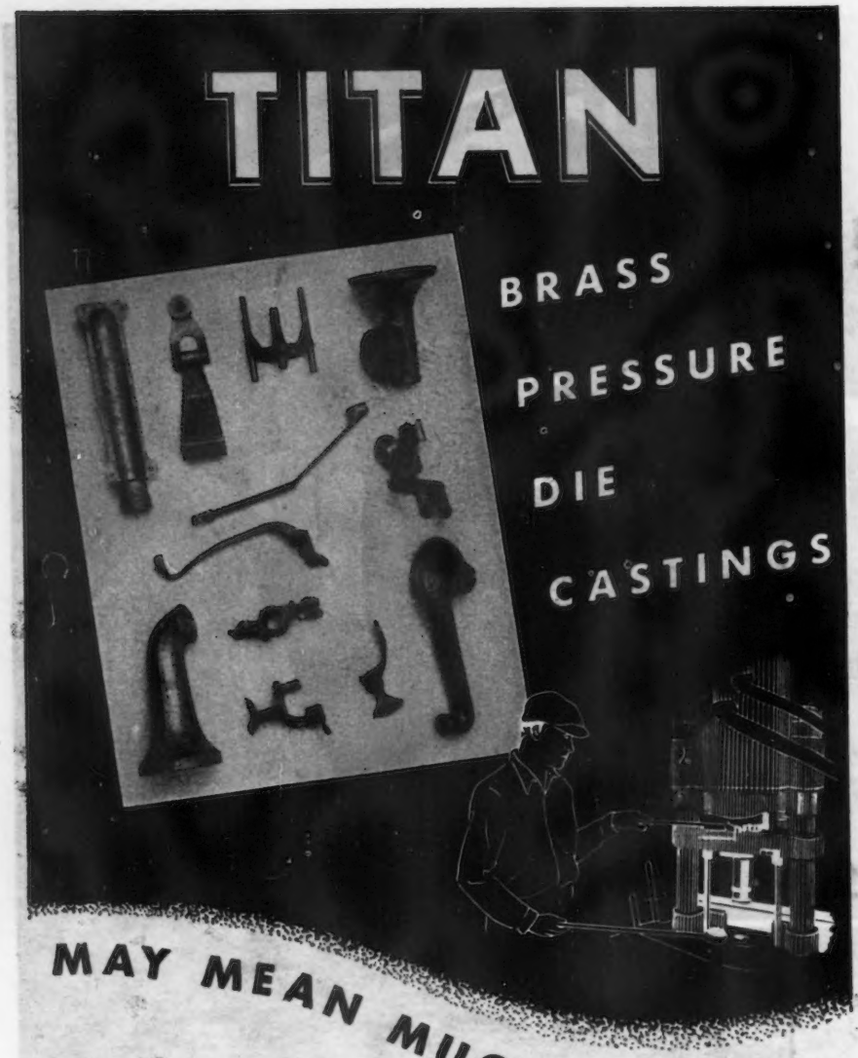

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Other manufacturers produce foundry pig in charcoal blast furnaces in Sweden, partly from low phororus ores for manufacture of malleable iron casting and for mixing. In some cases the natural manganese content of the ore contributes to the quality of the pig. Some makers claim advantages from a relatively low intensity of blast, as well as from the use of charcoal.

In the production of pig iron for processing to Walloon iron for blister steel used in the crucible steel process at the Osterby plant, formerly Dannemora, only cold blast was employed until recent years and may still be used. Production is very small, however.

During the war, when imports of coke and satisfactory coking coal have been insufficient to meet the needs of the industry, charcoal has of necessity been used in the production of pig intended for the manufacture of commercial grades of steel. The fuel cost was about doubled thereby.

Sweden is now producing considerable iron by methods of direct reduction from ore. The principal examples of this are the sponge iron processes, in which the iron is recovered in a spongy mass, of very low carbon content. That iron is particularly valuable in high grade steel production, as a substitute for pig iron and scrap, but it is expensive. Other direct processes, which are apparently in a more or less experimental stage, produce steel direct from ore.

Crosley to Continue Building New Cars

Cincinnati

• • • **Following the sale** of Crosley interests in Crosley Corp., to Aviation Corp., Mr. Crosley announced that a new company will be formed for the manufacture of the Crosley automobile. This portion of the corporation, having been retained by the original owner, at the time of Crosley sale to Aviation Corp. At the same time he reported that the Crosley plant had been allocated 16,000 cars for the next 12 months and that additional assembly will take place in a plant recently acquired for that purpose in Cincinnati. Engines and upholstery will be probably made in Cincinnati, he reported, but the bodies will be manufactured elsewhere. Other local industries associated with the automobile business indicated a program of retooling and revamping in preparation for auto manufacture.

Public Works Program Seen as No Answer To Unemployment Problem

Washington

• • • **Depending upon** public works construction to offset unemployment that might appear in other parts of the American economy would be expecting a very small tail to wag a very large economy, according to Oscar B. Coblentz, of Baltimore, Md., who has filed with the Senate Small Business Committee a statement on behalf of the Construction and Civic Development Department Committee of the Chamber of Commerce of the United States. Mr. Coblentz is president of the McLean Contracting Company of Baltimore. He was scheduled to appear before the committee at hearings on June 21, but the hearings were postponed. He then filed his statement. In normal times total expenditures for public works by federal, state, and local governments together account for only about 4 per cent of the national income, he pointed out. He suggested that a more reasonable goal would be to try for greater stability of the construction industry itself.

Even in approaching the more limited objective of industry stabilization, the Chamber representative continued, account must be taken of the fact that the normal proportion of private construction dollars to government dollars is two to one. This means that private construction must play its part in encouraging a steadier flow of funds into new structures and improvements. One way of promoting greater stability of private investment, he said, would be to have an impartial government agency, such as the Bureau of Foreign and Domestic Commerce of the Department of Commerce, assemble and publish authoritative information on the volume of construction, both private and public, currently going forward and reasonably to be anticipated, with the amounts of employment and of construction materials and equipment involved.

The theory that public works can be planned and then placed on the shelf for later execution, Mr. Coblentz told the committee, has its limitations. When private home building is active, for example, the need for new streets, schools, water and sewage works, and other services is also stimulated, and failure to provide these would hold back private construction, resulting in more harm than good. Further

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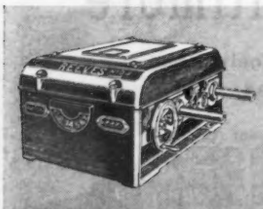

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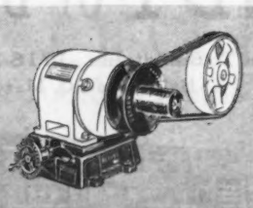

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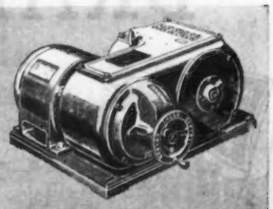

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study is needed to determine more definitely what public works can be deferred, and the number and types of jobs that would be affected. Without this information the proposal to use public works to sustain construction volume will be no more than guess work.

Such flexibility in public works construction as proves to be possible, Mr. Coblentz pointed out, can be effective only as the result of a deliberate, well-organized, and continuous effort on the part not only of the construction agencies of the federal government, but also of the thousands of state and local governments which initiate public works projects. Many legal and administrative difficulties must be overcome to make this effort.

Regarding the immediate problem of preparing a postwar public works program, the witness voiced approval of the provision of federal and state funds for making surveys and preparing plans in advance of the actual start of construction. He urged that there should be team work on the part of the federal and the state and local governments. He suggested a strengthening of the overall supervision of proposed federal public works.

In conclusion, Mr. Coblentz warned that the problem of securing a more stable volume of construction activity can be approached in either of two ways. One method would make the federal government the planning agency, with private industry, the states, and the local communities being induced to fit their plans into the established pattern. The other would leave the planning in the hands of private and local authorities, with the federal government giving encouragement and assistance. The second should be adopted, he asserted, both because it fits established concepts of government and because, in the long pull, it will get the best results.

Government Scrap Offered

Boston

• • • **Bids for 162,000** 3-in. shells weighing approximately 1000 tons, now obsolete, will be opened at the office of the Navy Material Redistribution and Disposal Office, 421 Summer St., Boston, July 6.

Salvaged auto parts, part of the cargo washed out of the wrecked freighter off the Maine coast, will be auctioned at the Appraisers Stores, July 2. Material includes auto frames, piston rings, tubes, propeller shafts, shaft bearings and miscellaneous parts destined for Europe.

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"We don't hit the island beaches, loaded down with what it takes to blast the Jappo. But back at the beginning of things, in the dusty unromantic job, we've stuck to our resolve to supply the ton on ton of needed ferro-alloys for the iron and steel makers. We've seen the ships, the tanks, the shining shell-cases . . . all better for our contribution. We're in it, we're part of it, and we'll be here 'til the Son of Heaven hollers 'Uncle!' "

COAST GUARD PHOTO FROM ACME

The men and women of Ohio Ferro-Alloys Corporation have stood wholeheartedly and faithfully behind the vital war-time metal production program. Increased demand for high-grade ferro-alloys and the calling of young men into National Service put the weight of effort on our veteran employees and untried but willing recruits. The record will attest their loyalty and strength.

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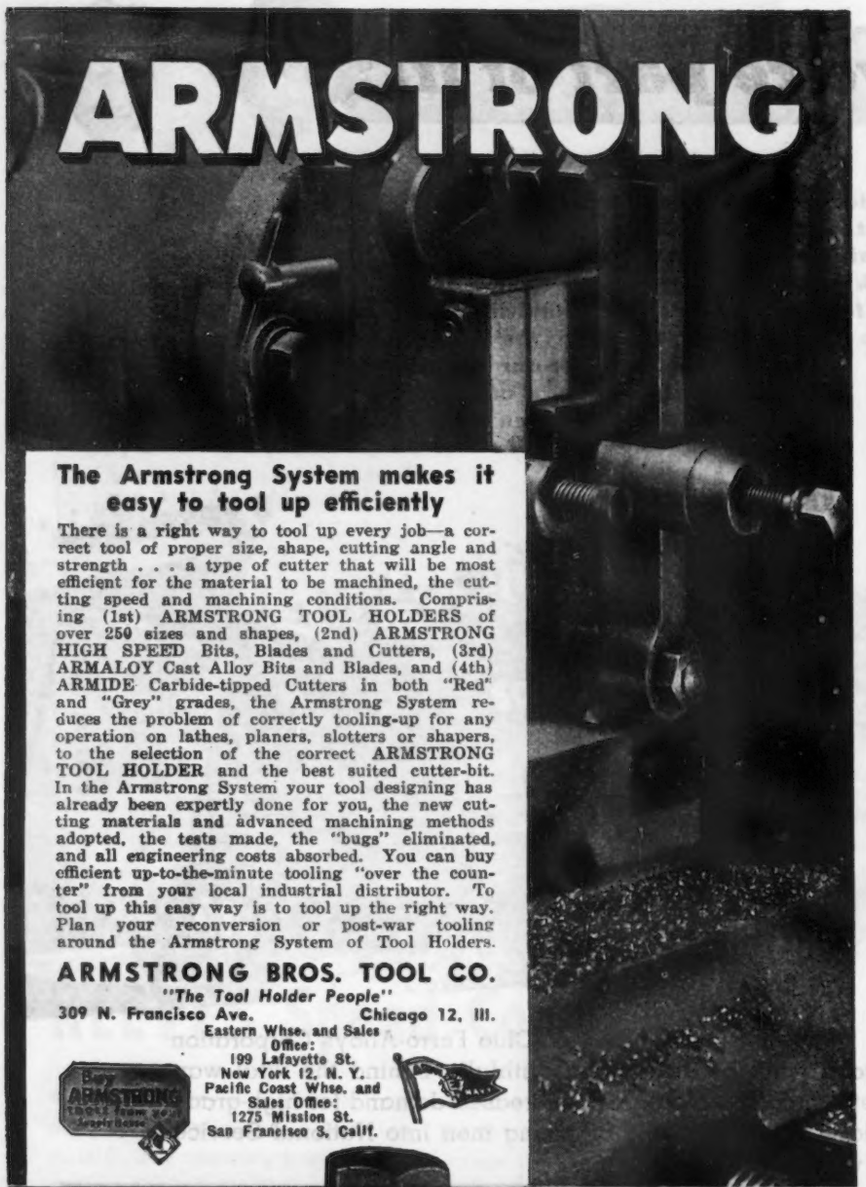
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ARMSTRONG TOOL HOLDERS Are Used in Over 96% of the Machine Shops and Tool Rooms

Cutting Tool Men Approve Proposed New Sales Program

Detroit

• • • **The industry-and-government** plan for orderly disposal of government owned surplus tools was recommended for immediate adoption to the cutting tool industry by the Cutting Tool Manufacturers' Association at a general membership meeting at the Detroit-Leland Hotel recently.

With representatives of the RFC present to answer all questions, the membership of the association indicated its approval of the plan under which each tool manufacturer, by contract, becomes an agent of the government for the purpose of disposal of surplus tools.

In commenting on the plan, Association President W. G. Robbins, president, Carboloy Co., Inc., Detroit, Division of General Electric, said:

"We regard this as the finest cooperative plan for disposal of surplus war materiel yet developed. It protects the interests not only of the individual manufacturer and his employees and agents but also of the government and the taxpayer.

"With this plan it becomes possible to immediately scrap such surpluses as have no market value in their existing form, making the raw materials available for other purposes; it makes possible quick reconversion of tools which have a definite use with slight modifications; it makes available for resale standard types of tools at market value without the danger always involved in 'dumping' of surpluses; it protects the jobs of workers in the tool industry since it provides for proportionate sales of surplus and newly produced tools of the same type by each manufacturer."

Metal Makers Elect Officers

Pittsburgh

• • • **At a recent** meeting of the Electric Metal Makers Guild, Inc., the following officers were elected for the coming year: J. A. deBondy, superintendent of melting, Manitoba Steel Foundries, Ltd., Selkirk, Manitoba, Canada; vice-president, J. E. Arthur, superintendent of melting, Crucible Steel Co. of America, Park Works, Pittsburgh; secretary-treasurer, D. L. Clark, superintendent of melting, Simonds Saw & Steel Co., Lockport, N. Y.

Reconversion Needs Heard by Pressed Metal Institute

Buffalo

• • • **Reconversion plans** for the country's pressed metal manufacturers were described as dependent on promptness in the settlement of war contracts, according to Maj. R. E. Newcomb, of the Rochester Ordnance District in a speech before the Pressed Metal Institute held here recently.

The Major cautioned that thinking in connection with reconversion should be on a realistic basis toward Japanese War production and that this caution should not be lost sight of until VJ-Day.

The War Department however, he said, is ready to handle the load of terminated war contracts, although there will not be a 40 pct termination at this time as once expected. The decrease in business of the Rochester Ordnance District as a result of VE terminations is only 17 pct and cutbacks are of gradually declining nature rather than an abrupt cut-off.

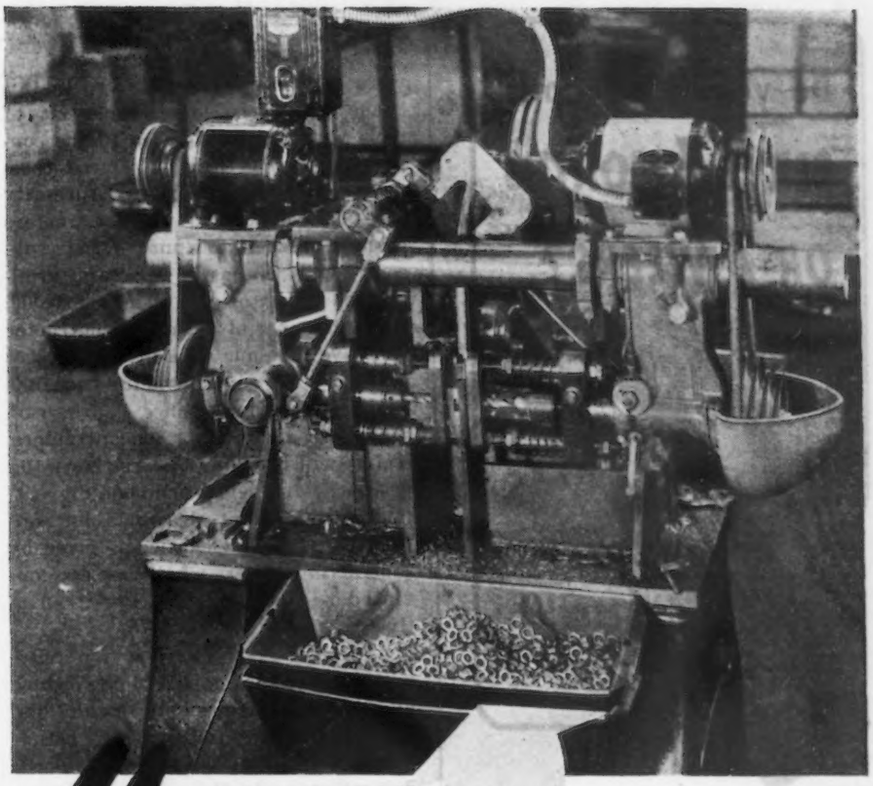
The War Departmetn has been preparing for termination since early 1943. For the first time in the history of war, the U. S. made up its official mind at that time that some day the war would end. Thus, plans were established and organizations developed to cope with that eventuality, according to Major Newcomb.

The Contract Settlement Act of 1944 was passed. The JTRs adopted last November implemented the purposes of this act. These regulations are followed closely in the settlement of terminations as they are tested procedures and have not been found wanting.

Actually, the War Department has no responsibility for reconversion. Their sole responsibility is to clear away the fiscal and property problems of contract termination. However, unless plants are cleared of left-over property, reconversion will be impractical if not impossible.

Pretermination planning will assist in eliminating the time required between the date of termination, and the date the contractor can begin civilian work. In reality, pretermination planning is a way of telescoping time so that before contracts are terminated, what is going to be done when they *are* terminated can be agreed upon.

Other devices to speed settlements



Here the extra cost of a special machine is saved.

with stock-model Delta units

A typical war production experience showing how to cut your investment risk in retooling—yet maintain volume and quality:

1. Use standard, low-cost Delta components to build your own high-production, special-purpose machines — quickly convertible to other uses when requirements change.

2. To modernize your present machines that are rapidly approaching obsolescence, replace worn elements with regular, stock-model Delta units.

3. Utilize the portability and compactness of Delta-Milwaukee Machine Tools, to revise or supplement production-line layouts for the best sequence of operations.

MA-21

● Automatic Screw Machine Products Co., Chicago, Ill., was faced with the problem of making fully automatic the countersinking of aircraft nuts before tapping.

Like many another war plant, the firm found the answer in the versatility of Delta-Milwaukee Machine Tools . . . in their ability to operate in any position—upside down, sideways, or at an angle — without lubrication problems.

Two low-cost Delta 14" Drill Presses were mounted "face down" on the same column, to make a high-production machine suited to the specific job requirements.

The former rate for countersinking on a hand-operated machine was 1500 pieces per hour. The special set-up (illustrated) turned out 4800 pieces per hour — more than three times former production!

Delta's savings in cost, weight, and space are not obtained at the expense of quality. They result from advanced design and from quantity production of standard models.

Low-cost Delta units and the ingenuity of your engineers may be the solution to *your* changing production problems. Investigate the many advantages of tooling up with famous Delta-Milwaukee Machine Tools.

Delta MILWAUKEE Machine Tools

Delta's 76-page Blue Book provides case histories of 140 production ideas that got results. Helps you more clearly visualize the almost unlimited money-saving applications of Delta-Milwaukee Machine Tools. Also available is a catalog of these low-cost machine tools. Request both, using coupon below.

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Please send my free copies of Delta's 76-page Blue Book and catalog of low-cost machine tools.

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Company_____

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City_____ ( ) State_____

Do your pinch rolls SERVE 7 MONTHS OR 7 WEEKS?

Operating in a butt-weld tube mill, uncoated rolls, used for feeding cold strip into a leveling machine, averaged 7 *weeks* of service. However, when protected with Coast Metals Hard-Facing, these rolls lasted 7 *months*—and even then the hard-faced surface was still in good condition. It was the excessive wear on the uncoated roll necks that necessitated removal from the machine.

Any ferrous surface, overlaid with Coast Metals Hard-Facing, stands up exceptionally well against wear, abrasion, shock, impact and heat. Fast, easy, inexpensive application!

Details in Pamphlet S101 will be sent promptly. Write for your copy today.

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1232 Camden Ave., S.W. Canton 6, Ohio
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COAST METALS
hard-facing weld rods
MAKE YOUR EQUIPMENT LAST LONGER

were described by the Major. In this connection there is a whole kit of tools which can be placed in the contractor's hands to use. One tool is delegation of authority. Authority can be delegated to war contractors permitting them to approve their subcontractors' claims or to retain termination inventories under $10,000. With this special permit, a contractor can save precious time by giving spot approval to subcontractors' claims submitted to them. Since a large percentage of all first-tier subcontractors' claims will probably be less than $10,000 each, this delegation should greatly facilitate plant clearance and settlements. Such delegation is given by contracting officers when they are convinced a contractor will use it effectively.

"Another green light is the automatic $1000 delegation under which all war contractors can make final settlements of termination claims amounting to $1000 or less. These delegations make the war contractor a working partner in the field with the government in order to save time and get the job done more efficiently.

"Subcontractors should be aware of these effective tools and push their primes to take advantage of it. In the past, the record shows that the subs have not been obtaining prompt payments in many cases. With these delegations available, there is no reason why prompt settlements cannot be made. If necessary, the sub can apply to the government's contracting officer for direct payment.

"War contractors have little excuse for holding up payments of settled subcontractors' claims, because of lack of adequate financing. Under the interim financing program, war contractors can obtain needed fiancing through two channels. First, a partial payment from the government's contracting officer, and second, T-loans from local commercial banks, which are guaranteed by the government.

"Another aid which industry is finding most helpful is the new contractor program established covering the entire country. Unless the contractor can draw up a proper and acceptable claim, his settlement cannot be undertaken. This training course is giving contractors definite information so that this job can be correctly handled. In the past, many claims submitted on the Standard Contract Settlement Proposal Form had to be returned for revision because they were not properly made out.

"The War Department today has over 14,000 trained persons working on contract settlement and related problems. This number has steadily increased and it is anticipated that it will be considerably larger in the future. It behoves every contractor to scrutinize his own termination settlement department and make adequate preparations for sufficient high caliber personnel to handle the problems involved.

"Plant clearance problems will also be augmented in the future. Up to now, the removal of termination inventory from war plants has been comparatively simple because other war uses required a great deal of this excess property. However, as war production decreases, this outlet also decreases and a new emphasis will be thrown on the ingenuity of the contractor in disposing of excess property.

"The War Department does not actually back up trucks and remove termination inventory. They will, however, provide instructions for packing, and shipping tickets. Contractors will have to pick up the pieces, roll them to the front door, and deliver them to the appropriate transportation system.

"In spite of some 37,000 terminations to date, there are still some contractors who have experienced no terminations. The War and Navy Departments have issued a revised 'Contractors Guide' and the 'Army-Navy Production Adjustment Bulletin' to assist contractors in handling terminations. These should be read carefully by every firm. It is the responsibility of the prime contractor to settle with his subcontractors in a vertical chain.

"Termination Coordination Committees have been established in the 21 chief industrial areas to work toward a closer cooperation betwen governmetn agencies, so that duplication of effort will be avoided and red tape diminished. This should result in fewer visits on the part of government personnel to contractors' plants.

"A Consolidated Termination Program has been established to avoid duplication of work in plants. Under this program a contractor is assigned to a single procurement agency who will then handle all accounting and property disposal for all government agencies. To date 48 plants have been assigned under this program.

"Direct settlements between some procurement agencies and large contractors are now being made in a few special cases. The procurement agency settles all termination claims and clears the plants for all services.

Choosing The Consulting Engineer

(CONTINUED FROM PAGE 73)

man who comes to do a certain job and then goes away quickly so that the blame for mistakes will fall on someone else. During the war, manufacturers have seen plenty of government experts come to their factories, issue advice freely and then disappear to let the permanent staff labor on the problems. Manufacturers who are willing to pay company money for the disappearing expert are not entirely fair to their own engineering staffs.

As long as the engineering profession in the United States remains uncontrolled by State or Federal laws,, there is only one course for the manufacturer to follow. He should insist that he is not buying any vague general services, but only the actual services rendered in his plant by engineers. He should insist upon an advance interview with the engineer or engineers who are to be assigned to the plant. He should insist that these men be competent engineers of such standing that they will have the respect of his own staff. If they are to give him managerial advice, either personally or in written reports, he should assure himself that the engineers are of the type who belong on his own level, that they have a broad experience in industry and that they are fully competent to give advice that he can trust. It is not sufficient to believe that reports written by enthusiastic beginners can by some magic be professionalized in a distant home office. If these simple rules are followed, the manufacturing executive will not only be saving himself from possible embarrassment, but he will also be helping to elevate the professional standards of engineering in the whole of industry.

Joins Foremen's Union Fight

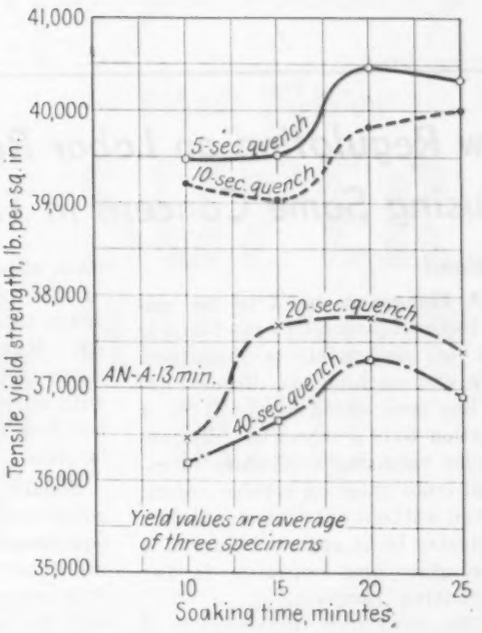
Detroit

• • • **Chrysler Corp.** has, for the first time, taken an active part in the fight of other automobile companies against unionization of foremen and other supervisors.

Chrysler outlined its feelings on the subject in quarter page advertising which appeared in Detroit. The statement described the functions and the responsibilities of foremen.

Effect of Delayed Quench Erratum

Reproduced at the right is the correct chart for Fig. 4 in the article, "Effect of Delayed Quench on the Strength of Alclad 24S-T Sheet," which appeared in the May 24, 1945 issue under the byline of J. E. Douglas, Boeing Aircraft Co. Due to an error in redrawing the chart the incorrect scale was given for the abscissa, soaking time. The correct figures indicate that maximum strength is obtained with a soaking period of 20 min. instead of 30 min. as originally indicated. For solution heat treated Alclad 24S-T, the specification minimum yield strength is 37,000 lb. per sq. in.



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Quality Springs
ALL SHAPES • ALL SIZES • ALL MATERIALS
LEE SPRING COMPANY, Inc.
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BROOKLYN, N.Y.
LEE-BUILT TRADE MARK SPRINGS

MACHINE TOOLS

. . . News and Market Activities

New Regulation on Labor Rates Causing Some Concern in Tool Industry

Cleveland

• • • **Things are quiet** in the machine tool companies. To the familiar gamut of renegotiations, priorities, pricing and machine tool disposal another has been added in the form of Regulation 581, a somewhat disturbing order requiring companies to report all labor rates on service orders. But even without this latest adjunct, the industry lacks any semblance of a roseate glow and optimism is far from running rampant.

For the most part, that section of the industry not producing machinery for war is taking care of automobile orders. Some few are still on lend-lease and with monthly shipments approximating $40 million dollars over all, it becomes increasingly evident that our surplus is due for some big contributions.

With the dealers there is rumored talk of getting in on surplus disposal and in some districts this seems very likely. But for the present, nothing is being moved. According to reports, as soon as some policy is formulated whereby this equipment will be available to the trade, it is likely that RFC will make use of the dealers and the manufacturers as well, simply because they are the people who know most about it. Already at least one of this area's better dealers has been asked to serve in an advisory capacity. Many suggestions are being made to the Surplus Property Board with an eye to getting the dealers in, but how it will work out remains to be seen.

Should the demand be for new equipment, and there is much such equipment in private hands, it will eventually come on the market too. And as times get bad, it will naturally sell for less than the government price. Of course, the government has a good deal to offer in the financing plan that makes it easy for a man to buy. But commercial credit might, and very likely would, take steps to meet this contingency.

Unfortunately, some machine tool builders have lulled themselves into a temporary torpor on the problem of surplus disposal, simply because most of the machines listed so far fell under the general classification of clunkers and no one is going to buy them. But the government is going to take over a good many new machines and some time, perhaps about two years from now, all this new equipment will hit the market in a gush, and it may be assumed that some companies will be the recipients of a rude awakening.

•

Buick Offers 0.1% Of Cost for Tools

Chicago

• • • **Buick Div.** of General Motors Corp. has offered Defense Plant Corp. $19,900 for special jigs, dies, gages and fixtures costing $19,900,000 used in the production of aircraft engines for which contracts have been canceled. Most of the tools are located at the Melrose Park Plant near here, and some are at Flint, Mich.

Following tour of the plant at the invitation of DPC a panel of 10 representatives from Chicago industrial concerns recommended that the Buick proposal to scrap the tools be accepted. It was indicated that the government would accept the offer.

The 0.1 pct recovery on the basis of scrap value is based on previous disposals by Buick. The company has scrapped 13,466 items of special durable tools in the last 23 months with the approval of DPC which owns the Melrose Park Plant. Gross recovery has been $1260 on cost valuation $1,494,781.

•

Machine Tool Worries Lessen

Detroit

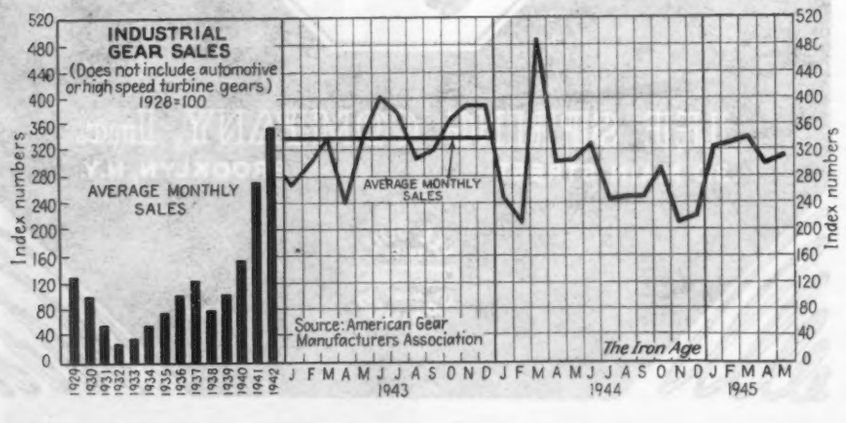
• • • **Worries over machine** tool requirements for reconversion appear to be diminishing in automobile companies. Little is being said on this score, while at the same time preparations are going rapidly forward to inaugurate production on some lines during the coming few weeks.

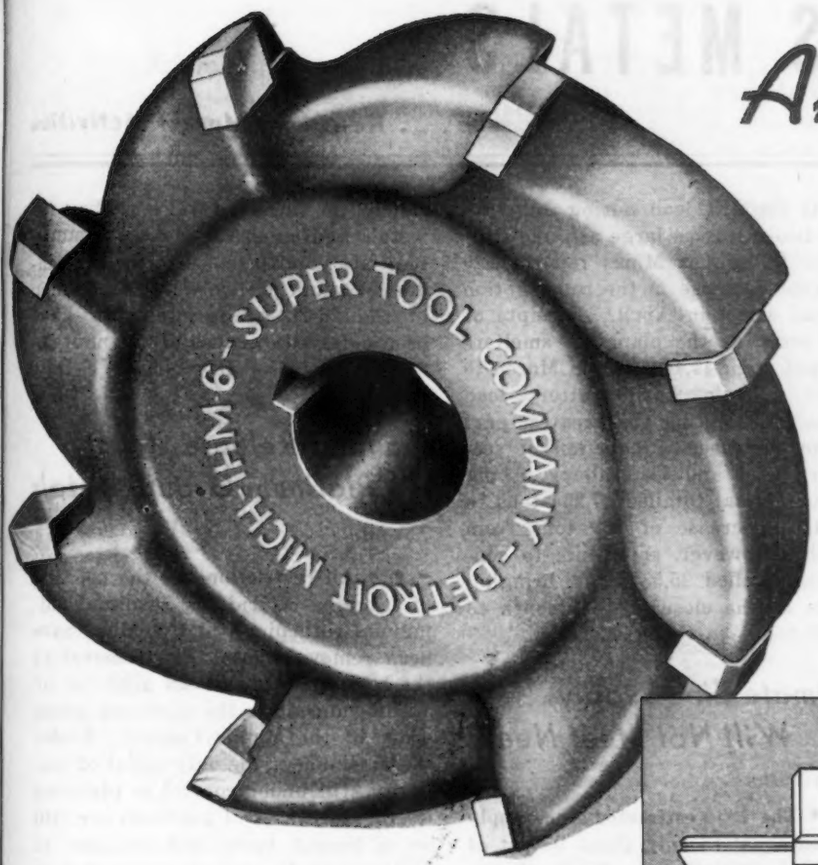
With initial production very small, makeshift facilities are going to be sufficient to get out the first runs of 1946 model cars, and in the meantime fuller complements of machines will be at hand.

Priority aid to enable manufacturers to get presses, a tight bottleneck, is relieving that situation. Other classes of equipment, hitherto hard to get, have been brought closer to hand by war order cancellations and lessened pressure for export deliveries.

May Gear Sales Decrease

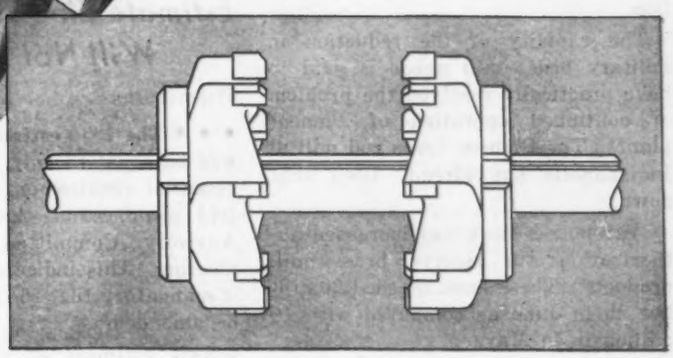
. . . The gearing industry, as represented by the members of the American Gear Manufacturers Assn., shows an increase in the volume of sales for May, as compared with April, of 4.4 per cent. This report does not include turbine or propulsion gearing. The index figure for May was 309.





Announcing-

the New SUPER HALF SIDE MILL!



Designed to be used in pairs for straddle milling or singly to cut on one side only

Another Addition to the Most Complete Line of Carbide Tipped Cutters on the Market!

Here's another Super development—another addition to Super Tool's extensive line of Carbide Tipped Tools! The New Super Half Side Mill!

Here is a rugged, heavy duty tool designed for the tough jobs . . . those production jobs that are too heavy for regular half side mills.

Made in both right hand and left hand, these half side mills are available in a range of sizes from 4" to 12" in diameter. They are manufactured in three types for non-ferrous, cast iron and steel. Designed for straddle milling, they can be mounted individually on an arbor to cut on one side only.

Most sizes are now available for immediate delivery from stock. The complete range of sizes will be available from stock soon. Write, wire or phone for complete data and prices.

Whatever
YOUR CUTTING JOB
LOOK *FIRST* TO
SUPER

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CARBIDE-TIPPED TOOLS FOR
Turning, Facing
Reaming Forming
Spot Facing
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Carbide Tipped Tools

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NON-FERROUS METALS

. . . News and Market Activities

Announce Additional Brass Mill Cutbacks

Washington

• • • **Cutbacks have** further reduced military needs for brass mill strip and rod, WPB officials have announced, making it desirable to close down some of the DPC brass mills.

Military brass strip requirements have now been cut to 100 million lb monthly from a 1945 monthly peak of 412 million lb; rod requirements have dropped to 60 million lb from 134 million lb; tubing to 20 million lb from 35 million; copper base alloy products to 25 million lb from 35 million.

The rapidity of the reduction in military brass mill needs is said to have practically resolved the problem of continued operation of Plancor plants. The Plancor brass rod mill at Indianapolis has already been shut down.

Warehouses have had increased authorizations to receive brass mill products. These have reached 20 million lb in June as compared with 10 million lb in May.

The Brass Mill Industry Advisory Committee has recently discussed methods of preparing brass for stockpiling under the contract termination procedure. The Army has agreed to stockpile all brass resulting from cancellations that the brass mills cannot use. Industry members agree that the brass should be cast in thin slabs to facilitate handling and that each slab should be stamped with its composition.

•

Lead Supply Easing Now

New York

• • • **The lead supply** picture appears to be easing somewhat, according to trade sources, and WPB has released another amendment to the lead order M38. The only significant modification in the regulation appears to be an increase in the quota for civilian batteries from 20 to 25 per cent of production.

The Metals Reserve stockpile is expected to reach 75,000 to 80,000 tons at the end of July, which represents an addition of approximately 10,000 tons over the past few months. It is reported from trade sources that requests for MR lead during July are only two-thirds as large as June's.

The Bureau of Mines reports a 9 per cent decrease in the consumption of lead scrap in April. Receipts of lead scrap at the plants of smelters dropped from 41,449 tons in March to 38,961 tons in April, battery lead plates representing the greatest part of the decrease. Production of secondary lead and lead alloys in pig and bar metal totalled 27,254 tons in April, a decrease of 729 tons from March. However, shipments to consumers totalled 25,554 tons, bringing stocks at the close of the month to 18,416 tons.

•

Estimate Zinc Supply Will Not Meet Needs

Washington

• • • **The 1945 estimated zinc** supply will be equal to only about 95 pct of essential requirements, WPB officials told members of the Zinc Industry Advisory Committee at a recent meeting. This indicated deficit makes it mandatory that the zinc order, M11, be amended.

This estimate of shortage in the supply of zinc for essential needs was based on estimates of secondary production and imports, in addition to estimated primary production. One official of the Tin, Lead and Zinc Division emphasized that in view of the revocation of M-11-b, which included most controls on the end use of zinc, some safeguards must be put into effect immediately to protect the supply for essential needs until production and demand are in balance.

It is expected that order M11 will be amended prior to July 1 inasmuch as August applications for slab zinc must reach WPB by July 12. The proposed amendment parallels the open ending of the CMP plan, as zinc will be reallocated to the extent available.

Of interest to holders of unrated orders is the proposed provision in M11 under which producers will hold zinc for manufacturers only up to the tenth day of each month. Through this plan it is hoped that cutbacks on manufacturers will immediately be reflected in an increase in the supply of zinc for other essential users and for unrated orders.

Possibilities for an early increase in zinc production appears rather cloudy, an official of WPB's office for metals and minerals told the committee. He pointed out that the zinc industry would probably lose more men in the 26-29 age group, who have been deferred, because of the new Selective Service policy since VE-Day.

•

Canada Releases Most Platinum Group Metals

Toronto

• • • **All restrictions** on the use and distribution of iridium, rhodium, palladium, ruthenium, and osmium have been removed here. The removal of the restrictions has been achieved by an amendment to the platinum group order of the Metals Control. Under the amendment the only metal of this group still under control is platinum itself. Purchases of platinum are still on a permit basis and the use of platinum in the manufacture of jewelry is prohibited.

•

Mercury Price Drops Again

New York

• • • **Mercury's price** has dropped to a range of $145 to $149 delivered New York, spot delivery. Future deliveries may be made at a somewhat lower price.

Sizeable shipments of this metal are coming in from Spain, and almost all of this imported mercury is reported to be employed in the big dry battery program. Without these imports, the trade feels that mercury would be selling at ceiling.

•

Indium Drops to $3 Oz.

New York

• • • **The price of indium** is said by at least one producer to have dropped to $3 per troy oz. This is a decline of $1 per oz. from the recent low and represents the latest step in a series of drastic price drops for this metal. It is said that even further reductions in price may be possible within a short time.

Another producer of indium has indicated that the price of the metal is not particularly significant inasmuch as practically all sales made are of plating alloys and solutions.

Primary Metals

(Cents per lb., unless otherwise noted)

Aluminum, 99+%, del'd (Min. 10,000 lb.)	15.00
Antimony, American, Laredo, Tex.	14.50
Beryllium copper, 3.75-4.25% Be; dollars per lb. contained Be	$17.00
Cadmium, del'd	90.00
Cobalt, 97-99% (per lb.)	$1.50 to $1.57
Copper, electro, Conn. valley	12.00
Copper, electro, New York	11.75
Copper, lake	12.00
Gold, U. S. Treas., dollars per oz.	$35.00
Indium, 99.8%, dollars per troy oz.	$3.00
Iridium, dollars per troy oz.	$120.00
Lead, St. Louis	6.35
Lead, New York	6.50
Magnesium, 99.9 + %, carlots	20.50
Magnesium, 12-in. sticks, carlots	27.50
Mercury, dollars per 76-lb. flask, f.o.b. New York	$145.00 to $149.00
Nickel, electro	35.00
Palladium, dollars per troy oz.	$24.00
Platinum, dollars per oz.	$35.00
Silver, open market, New York, cents per oz.	44.75
Tin, Straits, New York	52.00
Zinc, East St. Louis	8.25
Zinc, New York	8.65

Remelted Metals

(Cents per lb. unless otherwise noted)

Aluminum, No. 12 Fdy. (No. 2)	9.00 to 10.00
Aluminum, deoxidizing No. 2, 3, 4	$6.00 to 9.50
Brass Ingot	
85-5-5-5 (No. 115)	13.25
88-10-2 (No. 215)	16.75
80-10-10 (No. 305)	16.00
No. 1 Yellow (No. 405)	10.25

Copper, Copper Base Alloys

(Mill base, cents per lb.)

	Extruded Shapes	Rods	Sheets
Copper	20.87	....	20.37
Copper, H.R.	....	17.37	....
Copper drawn	....	18.37	....
Low brass, 80%	....	20.40	20.15
High brass	....	....	19.48
Red brass, 85%	....	20.61	20.36
Naval brass	20.37	19.12	24.50
Brass, free cut	....	15.01	....
Commercial bronze, 90%	....	21.32	21.07
Commercial bronze, 95%	....	21.53	21.28
Manganese bronze	24.00	....	28.00
Phos. bronze, A, B, 5%	....	36.50	36.25
Muntz metal	20.12	18.87	22.75
Everdur, Herculoy, Olympic or equal	....	25.50	26.00
Nickel silver, 5%	....	28.75	26.50
Architect bronze	19.12	....	....

Aluminum

(Cents per lb., subject to extras on gage, size, temper, finish, factor number, etc.)

Tubing: 2 in. O.D. x 0.065 in. wall 2S, 40c. (½H); 52S, 61c. (O); 24S, 67½c. (T).

Plate: 0.250 in. and heavier: 2S and 3S, 21.2c.; 52s, 24.2c.; 61S, 22.8c.; 24S, 24.2c.

Flat Sheet: 0.188 in. thickness: 2S and 3S, 22.7c. a lb.; 52S, 26.2c.; 61S, 24.7c.; 24S, 26.7c.

2000-lb. base for tubing; 30,000-lb. base for plate, flat stock.

Extruded Shapes: "As extruded" temper; 2000-lb. base, 2S and 3S, factor No. 1 to 4, 25.5c.; 14S, factor No. 1 to 4, 35c.; 17S, factor No. 1 to 4, 31c.; 24S, factor No. 1 to 4, 34c.; 53S, factor No. 1 to 4, 28c.; 61S, factor No. 1 to 4, 28½c.

The factor is determined by dividing perimeter of shape by weight per lineal foot.

Wire Rod and Bar: Base price; 17ST and 11ST-3, screw machine stock. Rounds: ¼ in., 28½c. per lb.; ½ in., 26c.; 1 in., 24½c.; 2 in., 23c. Hexagonals; ¼ in., 34½c. per lb.; ½ in., 28½c.; 1 in., 25½c.; 2 in., 25½c. 2S, as fabricated, random or standard lengths, ¼ in., 34c. per lb.; ½ in., 25c.; 1 in., 24c.; 2 in., 23c. 24ST, rectangles and squares, random or standard lengths. 0.093-0.187 in. thick by 1.001-2.000 in. wide, 33c. per lb.; 0.751-1.500 in. thick by 2.001-4.000 in. wide, 29c.; 1.501-2.000 in. thick by 4.001-6.000 in. wide, 27½c.

Magnesium

Sheet, rod, tubes, bars, extruded shapes subject to individual quotations. Metal turnings: 100 lb. or more, 46c. a lb.; 25 to 90 lb., 56c.; less than 25 lb., 66c.

NONFERROUS SCRAP METAL QUOTATIONS

†*(OPA basic maximum prices, cents per lb., f.o.b. point of shipment, subject to quality, quantity and special preparation premiums—other prices are current quotations)*

Copper, Copper Base Alloys

OPA Group 1†

No. 1 wire, No. 1 heavy copper	9.75
No. 1 tinned copper wire, No. 1 tinned heavy copper	9.75
No. 2 wire, mixed heavy copper	8.75
Copper tuyeres	8.75
Light copper	7.75
Copper borings	9.75
No. 2 copper borings	8.75
Lead covered copper wire, cable	6.00*
Lead covered telephone, power cable	6.04
Insulated copper	5.10*

OPA Group 2†

Bell metal	15.50
High grade bronze gears	13.25
High grade bronze solids	11.50*
Low lead bronze borings	11.50*
Babbitt lined brass bushings	13.00
High lead bronze solids	10.00*
High lead bronze borings	10.00*
Red trolley wheels	10.75
Tinny (phosphor bronze) borings	10.50
Tinny (phosphor bronze) solids	10.50
Copper-nickel solids and borings	9.25
Bronze paper mill wire cloth	9.50
Aluminum bronze solids	9.00
Soft red brass (No. 1 composition)	9.00
Soft red brass borings (No. 1)	9.00
Gilding metal turnings	8.50
Contaminated gilded metal solids	8.00
Unlined standard red car boxes	8.25
Lined standard red car boxes	7.75
Cocks and faucets	7.75
Mixed brass screens	7.75
Red brass breakage	7.50
Old nickel silver solids, borings	6.25
Copper lead solids, borings	6.25
Yellow brass castings	6.25
Automobile radiators	7.00
Zincy bronze borings	8.00
Zincy bronze solids	8.00

OPA Group 3†

Fired, rifle shells	8.25
Brass pipe	7.50
Old rolled brass	7.00
Admiralty condenser tubes	7.50
Muntz metal condenser tubes	7.00
Plated brass sheet, pipe reflectors	6.50
Manganese bronze solids	7.25[1]
Manganese bronze solids	6.25[2]
Manganese bronze borings	6.50[1]

OPA Group 4†

Refinery brass	4.75*

*Price varies with analysis. [1] Lead content 0.00 to 0.40 per cent. [2] Lead content 0.41 to 1.00 per cent.

Other Copper Alloys

Briquetted Cartridge Brass Turnings	8.625
Cartridge Brass Turnings, Loose	7.875
Loose Yellow Brass Trimmings	7.375

Aluminum

Plant scrap, segregated

2S solids	8.00
Dural alloys, solids 14, 17, 18, 24S 25S	4.50
turnings, dry basis	3.00
Low copper alloys 51, 52, 61, 63S solids	7.50
turnings, dry basis	5.75

Plant scrap, mixed

Solids	4.00
Turnings, dry basis	2.75

Obsolete scrap

Pure cable	8.00
Old sheet and utensils	6.00
Old castings and forgings	5.00
Pistons, free of struts	5.00
Pistons, with struts	3.00
Old alloy sheet	5.00

Magnesium*

Segregated plant scrap

Pure solids and all other solids, exempt Borings and turnings	1.50

Mixed, contaminated plant scrap

Grade 1 solids	3.00
Grade 1 borings and turnings	2.00
Grade 2 solids	2.00
Grade 2 borings and turnings	1.00

*Nominal.

Zinc

New zinc clippings, trimmings	6.50
Engravers, lithographers plates	6.50
Old zinc scrap	4.75
Unsweated zinc dross	5.00
Die cast slab	4.50
New die cast scrap	4.45
Radiator grilles, old and new	3.50
Old die cast scrap	3.00

Lead

Deduct 0.55c. a lb. from refined metal basing point prices or soft and hard lead including cable, for f.o.b. point of shipment price.

Nickel

Ni content 98+%, Cu under ½%, 26c. per lb.; 90 to 98% Ni, 26c. per lb contained Ni.

ELECTROPLATING ANODES AND CHEMICALS

Anodes

(Cents per lb., f.o.b. shipping point in 500 lb lots)

Copper, frt. allowed	
Cast, oval, 15 in. or longer	25⅛
Electrodeposited	18⅞
Rolled, oval, straight	19⅛
Curved	20⅝
Brass, 80-20, frt. allowed	
Cast, oval, 15 in. or longer	23⅝
Zinc, cast, 99.99, 15 in. or longer	16¼
Nickel, 99 per cent plus, frt. allowed	
Cast	47
Rolled, depolarized	48
Silver, 999 fine	
Rolled, 1-9 troy oz., per oz.	58*

Chemicals

(Cents per lb., f.o.b. shipping point)

Copper cyanide, 1-5 bbls.	34.00
Copper sulphate, 99.5, crystals, bbls.	7.75
Nickel salts, single, 425 lb. bbls., frt. allowed	13.50
Silver cyanide, 100 oz. lots	—.4179
Sodium cyanide, 96 per cent, domestic, 100 lb. drums	15.00
Zinc cyanide, 100 lb. drums	33.00
Zinc sulphate, 89 per cent, crystals, bbls., frt. allowed	6.35

*Price based on use of foreign silver.

SCRAP

. . . News and Market Activities

Turnings Prices Continue to Advance

New York

• • • The market continued to strengthen this week with increases in turnings grades from practically every district. There is no increase in prices of openhearth scrap since these grades are already selling at ceilings. From many districts there

For additional scrap news see p. 88.

are reports stressing the need of mills for scrap and the effect of this upon scrap movements, limited only by the capacity of yards to prepare and deliver.

Brokers in the current markets where ceilings apply are reluctant to sell scrap short, since there is nothing to gain, and they would face a loss should the market toboggan. Neither are they willing to buy up large quantities of unprepared scrap, for the labor situation, isolated reports to the contrary notwithstanding, is still a serious handicap in conducting business.

All these factors have combined to compel wider application of the scrap allocation system and it would appear that unless more drastic steel contract cancellations occur reasonably soon, allocations of scrap may continue to grow.

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PITTSBURGH—All grades are in strong demand, and machine shop turnings advanced 50c. a ton to $13 range. Scrap shipments are definitely down, with one operator indicating more than a 15 pct drop from last month. Shipyard scrap is drying up and production and yard scrap is limited in quantity. Government offerings are increasing, but all in the unprepared bracket. Furthermore, much of this material is salvageable and the quantities of scrap involved in such materials are not known. The present condition of the market here makes it extremely difficult to forecast what will happen and there has been a tightening up on the part of brokers in buying policies. Most are trying to fill current orders but are shying away from either long or short buying. There are apparently many sound orders that are going begging because of the unavailability of material. Mills here, while comfortable from an overall scrap standpoint, are definitely making an effort to keep stocks up.

•

CHICAGO—Strong upward force continues to be exerted on grades which have not yet reached ceiling, and consumers' requirements promise to extend this situation indefinitely. Allocations have been made for local consumption from the South, Southeast and Southwest as well as neighboring states. Supply is short of requirements and drafts will be made on other districts to the full extent allowed, it appears.

•

DETROIT—Prices on turnings grades firmed here this week after opening of auto lists. Bids showed a definitely stronger range of prices. Scrap is scarce in most categories, with demand extending even to previously dull items like machine shop turnings, now wanted for hot metal charging to help make up for widespread shutdowns of blast furnaces for repairs.

•

BOSTON—Ceiling prices on heavier materials have stirred up business. Machine shop turnings prices range from $6 to $6.50 a ton on cars with most business at $6 to $6.25. Supply is expected to fall off this and next month owing to plant vacations and equipment adjustment to conform to civilian goods production. Asking price of $10.50 a ton for shoveling turnings has been withdrawn. Current sales are at $9.75 to $10 a ton. Foundries still take all cast and stove plate they can get. Low phos material also is in demand.

•

PHILADELPHIA—The scrap market continues strong this week with all openhearth grades at ceiling prices. Machine shop turnings have increased to $12 to $12.50 a gross ton with short shoveling turnings $1.50 more. Most mills here show no reluctance to pay ceiling prices for openhearth grades and with the market trends in turnings indicating higher prices, it is very probable that within the next week or two, they will have to pay ceiling prices for this grade as well. Shipments have not increased as a concomitant to the price rise. First, because scrap is still being shipped out of the northern New Jersey district to fill old orders at ceiling price and second, while unprepared scrap is plentiful, there is still a shortage of manpower to prepare it. Demand is still high for cast grades.

•

NEW YORK—The turnings market continues to strengthen in this district with openhearth grades and foundry scrap continuing at ceiling prices. Machine shop and mixed borings and turnings have increased to $8, and shoveling turnings to $10.50. Scrap volume continues high with mills requesting delivery of outstanding orders. However, the labor supply in local yards has not improved materially, thereby limiting shipments considerably. While this is the midpoint of the Barge Canal season, shipments are reported to have been light this year due to the need for scrap in New York and eastern Pennsylvania This may presage a shortage of scrap in the Buffalo area next winter after closing of the canal by ice.

•

CLEVELAND—Cleveland's scrap market is the tightest since the war began. Production is off and everybody is pushing the dealers. Since many blast furnaces are down, the decrease in pig iron has of course resulted in a heightening demand for scrap. Mills' inventories are going down fast and low phosphorus is the easiest, although even this is noticeably tighter.

•

ST. LOUIS—The movement of scrap iron to the steel mills in the St. Louis industrial district experienced another slowing down largely as a result of a shortage of manpower to gather and process the material. Chicago mills continue to draw material from this area on allocations. Outside interests' buying has shoved the price of machine shop turnings to $10.

•

CINCINNATI—Current quotations are unchanged in a quiet market. No new business is reported, mills and foundries holding present inventories but loath to extend commitments in the face of possible sudden cutbacks.

•

BUFFALO—Demand has caught up with diminishing supplies of turnings and borings, with prices advancing $1 a ton last week. The chief consumer came back into the market for the second time in a month with orders for 5000 tons of machine shop and short shoveling turnings at $12 and $15, respectively, and for 10,000 tons of bundles and heavy melting steel at ceilings. No brokerage was allowed but the market is definitely stronger for the openhearth grades. So far none of the mills has begun building up stocks for the winter, apparently satisfied to buy scrap as operations dictate until the smoke of cutbacks and cancellations is cleared away. Three thousand tons of canal scrap from New York arrived this week, but there have been no receipts by lake for more than a month.

Kaplan Increases Staff

Chicago

• • • Arnold J. Karol has joined M. S. Kaplan & Co., scrap brokers here, in the capacity of scrap trader. For four years he has been associated with Briggs & Turivas, Blue Island, Ill.

Construction Sales Co. Opens Chicago Brokerage Office

Chicago

• • • Construction Sales Co., Inc., of Albany, N. Y., New York City, and Cleveland, has opened a Chicago scrap brokerage office at 105 South LaSalle St. Ben Coplan will be in charge.

Going prices as obtained in the trade by IRON AGE editors, based on representative tonnages (for ceiling prices see O. P. A. schedule No. 4). Where ceiling prices are quoted they do not include brokerage fee or adjusted transportation charges. Asterisks indicate grades selling at ceilings.

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. melting	$20.00*
RR. hvy. melting	21.00*
No. 2 hvy. melting	20.00*
RR. scrap rails	21.50*
Rails 3 ft. and under	23.50*
No. 1 comp'd sheets	20.00*
Hand bdld. new shts.	20.00*
Hvy. axle turn.	19.50*
Hvy. steel forge turn.	19.50*
Mach. shop turn.	$12.50 to 13.00
Short shov. turn.	16.00 to 17.00
Mixed bor. and turn.	12.00 to 12.50
Cast iron borings	15.00 to 15.50
Hvy. break. cast.	16.50*
No. 1 cupola	20.00*
RR. knuck. and coup.	24.50*
RR. coil springs	24.50*
Rail leaf springs	24.50*
Rolled steel wheels	24.50*
Low phos. bil. crops	25.00*
Low phos.	22.50*
RR. malleable	22.00*

CHICAGO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$18.75*
No. 2 hvy. melting	18.75*
No. 1 bundles	18.75*
No. 2 dealers' bndls.	18.75*
Bundled mach. shop turn.	18.75*
Galv. bundles	16.75*
Mach. shop turn.	$12.50 to 13.00
Short shovel. turn.	13.50 to 14.50
Cast iron borings	12.75 to 13.75
Mix. borings & turn.	12.75 to 13.75
Low phos. hvy. forge	23.75*
Low phos. plates	21.25*
No. 1 RR. hvy. melt.	19.75*
Reroll rails	22.25*
Miscellaneous rails	20.25*
Rails 3 ft. and under	22.25*
Locomotive tires, cut	22.50 to 23.00
Cut bolsters & side frames	19.75 to 20.25
Angles & Splice bars	22.25*
Standard stl. car axles	23.50 to 24.00
No. 3 steel wheels	23.25*
Couplers & knuckles	23.25*
Agricul. malleable	22.00*
RR. malleable	22.00*
No. 1 mach. cast	20.00*
No. 1 agricul. cast	20.00*
Hvy. breakable cast	16.50*
RR. grate bars	15.25*
Cast iron brake shoes	15.25*
Stove plate	19.00*
Clean auto cast	20.00*
Cast iron carwheels	20.00*

CINCINNATI

Per gross ton delivered to consumer:

No. 1 hvy. melting	$19.50*
No. 2 hvy. melting	19.50*
No. 1 bundles	19.50*
No. 2 bundles	19.50*
Mach. shop turn.	$7.00 to 7.50
Shoveling turn.	8.00 to 8.50
Cast iron borings	8.00 to 8.50
Mixed bor. & turn.	7.00 to 7.50
Low phos. plate	22.00*
No. 1 cupola cast	20.00*
Hvy. breakable cast	16.50*
Stove plate	19.00*
Scrap rails	21.00

BOSTON

Dealers' buying prices per gross ton, f.o.b. cars

No. 1 hvy. melting	$15.05*
No. 2 hvy. melting	15.05*
No. 1 and 2 bundles	15.05*
Busheling	15.05*
Turnings, shovelings	$9.75 to 10.00
Machine shop turn.	6.00 to 6.50
Mixed bor. & turn.	6.00 to 6.50
Cl'n cast, chem. bor.	$13.06 to 14.15*

Truck delivery to foundry

Machinery cast	21.00 to 23.51*
Breakable cast	21.57 to 21.87*
Stove plate	20.00 to 23.51*

DETROIT

Per gross ton, brokers' buying prices:

No. 1 hvy. melting	$17.32*
No. 2 hvy. melting	17.32*
No. 1 bundles	17.32*
New busheling	17.32*
Flashings	17.32*
Mach. shop turn.	$7.75 to 8.25
Short shov. turn.	11.25 to 11.75
Cast iron borings	10.25 to 10.75
Mixed bor. & turn.	7.75 to 8.25
Low phos. plate	19.00 to 19.82
No. 1 cupola cast	20.00*
Charging box cast	18.00 to 19.00
Hvy. breakable cast	16.50*
Stove plate	18.50 to 19.00
Automotive cast	20.00*

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. melting	$18.75*
No. 2 hvy. melting	18.75*
No. 2 bundles	18.75*
Mach. shop turn.	$12.00 to 12.50
Shoveling turn.	13.50 to 14.00
Cast iron borings	13.50 to 14.00
Mixed bor. & turn.	12.00 to 12.50
No. 1 cupola cast	20.00*
Hvy. breakable cast	16.50*
Cast, charging box	19.00*
Hvy. axle, forge turn.	17.50 to 18.00
Low phos. plate	21.25*
Low phos. punchings	21.25*
Billet crops	21.25*
RR. steel wheels	23.25*
RR. coil springs	23.25*
RR. malleable	22.00*

ST. LOUIS

Per gross ton delivered to consumer:

Heavy melting	$17.50*
Bundled sheets	17.50*
Mach. shop turn.	8.00 to 8.50
Hvy. axle turn.	10.00
Locomotive tires, uncut	17.00
Misc. std. sec. rails	19.00*
Rerolling rails	21.00*
Steel angle bars	21.00*
Rails 3 ft. and under	21.50*
RR. springs	22.00*
Steel car axles	23.50*
Stove plate	19.00*
Grate bars	15.25*
Brake shoes	15.25*
RR. malleable	22.00*
Cast iron carwheels	20.00*
No. 1 mach'ery cast	20.00*
Breakable cast	16.50*

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting	$17.00*
No. 2 hvy. melting	17.00*
No. 2 bundles	17.00*
No. 1 busheling	17.00*
Long turnings	$9.50 to 10.00
Cast iron borings	9.50 to 10.00
Bar crops and plate	19.50*
Structural and plate	19.50*
No. 1 cast	20.00*
Stove plate	17.00
Steel axles	18.00*
Scrap rails	18.50
Rerolling rails	20.50*
Angles & splice bars	20.50*
Rails 3 ft. & under	21.00*
Cast iron carwheels	16.50 to 17.00

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. melting	$20.00*
No. 2 hvy. melting	20.00*
Low phos. plate	22.50*
No. 1 busheling	20.00*
Hydraulic bundles	20.00*
Mach. shop turn.	$11.50 to 12.00
Short shovel. turn.	15.50 to 16.00
Cast iron borings	14.50 to 15.00

NEW YORK

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	$15.33*
No. 2 hvy. melting	15.33*
Comp. black bundles	15.33*
Comp. galv. bundles	13.33*
Mach. shop turn.	8.00
Mixed bor. & turn.	8.00
Shoveling turn.	10.50
No. 1 cupola cast	20.00*
Hvy. breakable cast	16.50*
Charging box cast	19.00*
Stove plate	19.00*
Clean auto cast	20.00*
Unstrip. motor blks.	17.50*
Cl'n chem. cast bor.	14.33*

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$19.25*
No. 1 bundles	19.25*
No. 2 bundles	19.25*
No. 2 hvy. melting	19.25*
Mach. shop turn.	12.00
Shoveling turn.	15.00
Cast iron borings	13.00
Mixed bor. & turn.	12.00
No. 1 cupola cast	20.00*
Stove plate	19.00*
Low phos. plate	21.75*
Scrap rails	20.75*
Rails 3 ft. & under	22.75*
RR. steel wheels	23.75*
Cast iron car wheels	20.00*
RR. coil & leaf spgs.	23.75*
RR. knuckles & coup.	23.75*
RR. malleable	22.00*
No. 1 busheling	19.25*

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. melting	$19.50*
No. 2 hvy. melting	19.50*
Compressed sheet stl.	19.50*
Drop forge flashings	19.00*
No. 2 bundles	19.50*
Mach. shop turn.	$11.50 to 12.00
Short shovel.	14.50 to 15.00
No. 1 busheling	19.50*
Steel axle turn.	19.00*
Low phos. billet and bloom crops	24.50*
Cast iron borings	13.50 to 14.00
Mixed bor. & turn.	12.50 to 13.00
No. 2 busheling	17.00*
No. 1 machine cast	20.00*
Railroad cast	20.00*
Railroad grate bars	15.25*
Stove plate	19.00*
RR. hvy. melting	20.50*
Rails 3 ft. & under	23.00*
Rails 18 in. & under	24.25*
Rails for rerolling	23.00*
Railroad malleable	22.00*
Elec. furnace punch	22.00*

SAN FRANCISCO

Per gross ton delivered to consumer:

RR. hvy. melting	$16.50
No. 1 hvy. melting	16.50
No. 2 hvy. melting	15.00
No. 2 bales	$13.50 to 14.25
No. 3 bales	9.50 to 10.59
Mach. shop turn.	7.00
Elec. furn. 1 ft., und.	15.50 to 17.00
No. 1 cupola cast	19.00 to 21.00

LOS ANGELES

Per gross ton delivered to consumer:

No. 1 hvy. melting	$14.50 to $15.50
No. 2 hvy. melting	13.50 to 14.50
No. 2 bales	12.50 to 13.50
No. 3 bales	9.00 to 10.00
Mach. shop turn.	4.50
No. 1 cupola cast	19.00 to 21.00

SEATTLE

Per gross ton delivered to consumer:

RR. hvy. melting	$14.50
No. 1 hvy. melting	14.50*
No. 3 bundles	11.50
Elec. furn. 1 ft., und.	17.00
No. 1 cupola cast	20.00*

Comparison of Prices . .

Advances Over Past Week in Heavy Type; Declines in *Italics*. Prices are F.O.B. Major Basing Points. The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 148-157.

Flat Rolled Steel (Cents Per Lb.)	July 3, 1945	June 26, 1945	May 29, 1945	July 4, 1944
Hot rolled sheets	2.20	2.20	2.20	2.10
Cold rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.70	3.70	3.70	3.50
Hot rolled strip	2.10	2.10	2.10	2.10
Cold rolled strip	2.80	2.80	2.80	2.80
Plates	2.25	2.25	2.25	2.10
Plates, wrought iron	3.80	3.80	3.80	3.80
Stain's c.r. strip (No. 302)	28.00	28.00	28.00	28.00
Tin and Terne Plate: (Dollars Per Base Box)				
Tin plate, standard cokes	$5.00	$5.00	$5.00	$5.00
Tin plate, electrolytic	4.50	4.50	4.50	4.50
Special coated mfg. ternes	4.30	4.30	4.30	4.30
Bars and Shapes: (Cents Per Lb.)				
Merchant bars	2.25	2.25	2.25	2.15
Cold finished bars	2.65	2.65	2.65	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Stainless bars (No. 302)	24.00	24.00	24.00	24.00
Wrought iron bars	4.40	4.40	4.40	4.40
Wire and Wire Products: (Cents Per Lb.)				
Bright wire	2.75	2.75	2.75	2.60
Wire nails	2.90	2.90	2.90	2.55
Rails: (Dollars Per Gross Ton)				
Heavy rails	$43.00	$43.00	$43.00	$40.00
Light rails	45.00	45.00	45.00	40.00
Semi-Finished Steel: (Dollars Per Gross Ton)				
Rerolling billets	$36.00	$36.00	$36.00	$34.00
Sheet bars	36.00	36.00	36.00	34.00
Slabs, rerolling	36.00	36.00	36.00	34.00
Forging billets	42.00	42.00	42.00	40.00
Alloy blooms, billets, slabs	54.00	54.00	54.00	54.00
Wire Rods and Skelp: (Cents Per Lb.)				
Wire rods	2.15	2.15	2.15	2.00
Skelp	1.90	1.90	1.90	1.90

Latest steel price increase, Amendment 13 to RPS6, effective May 23, 1945.

Pig Iron: (Per Gross Ton)	July 3, 1945	June 26, 1945	May 29, 1945	July 4, 1944
No. 2 fdy., Philadelphia	$26.84	$26.84	$26.84	$25.84
No. 2, Valley furnace	25.00	25.00	25.00	24.00
No. 2, Southern, Cin'ti	26.11	26.11	26.11	25.11
No. 2, Birmingham	21.38	21.38	21.38	20.38
No. 2, foundry, Chicago†	25.00	25.00	25.00	24.00
Basic, del'd eastern Pa.	26.34	26.34	26.34	25.34
Basic, Valley furnace	24.50	24.50	24.50	23.50
Malleable, Chicago†	25.00	25.00	25.00	24.00
Malleable, Valley	25.00	25.00	25.00	24.00
L. S. charcoal, Chicago*	42.34	42.34	42.34	37.34
Ferromanganese‡	135.00	135.00	135.00	135.00

† The switching charge for delivery to foundries in the Chicago district is 60c. per ton.
‡ For carlots at seaboard.
Last pig iron price change authorized by OPA effective Feb. 14, 1945.
* Charcoal price increase retroactive to March 7, on contracts to Feb. 13.

Scrap: (Per Gross Ton)	July 3, 1945	June 26, 1945	May 29, 1945	July 4, 1944
Heavy melt'g steel, P'gh.	$20.00	$20.00	$20.00	$20.00
Heavy melt'g steel, Phila.	18.75	18.75	18.00	18.75
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	18.75
No. 1 hy. comp. sheet, Det.	17.32	17.32	17.32	17.32
Low phos. plate, Youngs'n	22.50	22.50	22.50	22.50
No. 1 cast, Pittsburgh	20.00	20.00	20.00	20.00
No. 1 cast, Philadelphia	20.00	20.00	20.00	20.00
No. 1 cast, Chicago	20.00	20.00	20.00	20.00
Coke, Connellsville: (Per Net Ton at Oven)				
Furnace coke, prompt	$7.50	$7.50	$7.50	$7.00
Foundry coke, prompt	9.00	9.00	9.00	8.25
Non-Ferrous Metals: (Cents Per Lb. to Large Buyers)				
Copper, electro., Conn.	12.00	12.00	12.00	12.00
Copper, Lake	12.00	12.00	12.00	12.00
Tin (Straits), New York	52.00	52.00	52.00	52.00
Zinc, East St. Louis	8.25	8.25	8.25	8.25
Lead, St. Louis	6.35	6.35	6.35	6.35
Aluminum, Virgin, del'd.	15.00	15.00	15.00	15.00
Nickel, electrolytic	35.00	35.00	35.00	35.00
Magnesium, ingot	20.50	20.50	20.50	20.50
Antimony, Laredo, Tex.	14.50	14.50	14.50	14.50

Composite Prices . .

Starting with the issue of April 22, 1943, the weighted finished steel price index was revised for the years 1941, 1942 and 1943. See explanation of the change on page 90 of the April 22, 1943, issue. Index revised to a quarterly basis as of Nov. 16, 1944; for details see p. 98 of that issue. The finished steel composite prices for the current quarter are an estimate based on finished steel shipments for the previous quarter. These figures will be revised when the actual data of shipments for this quarter are compiled.

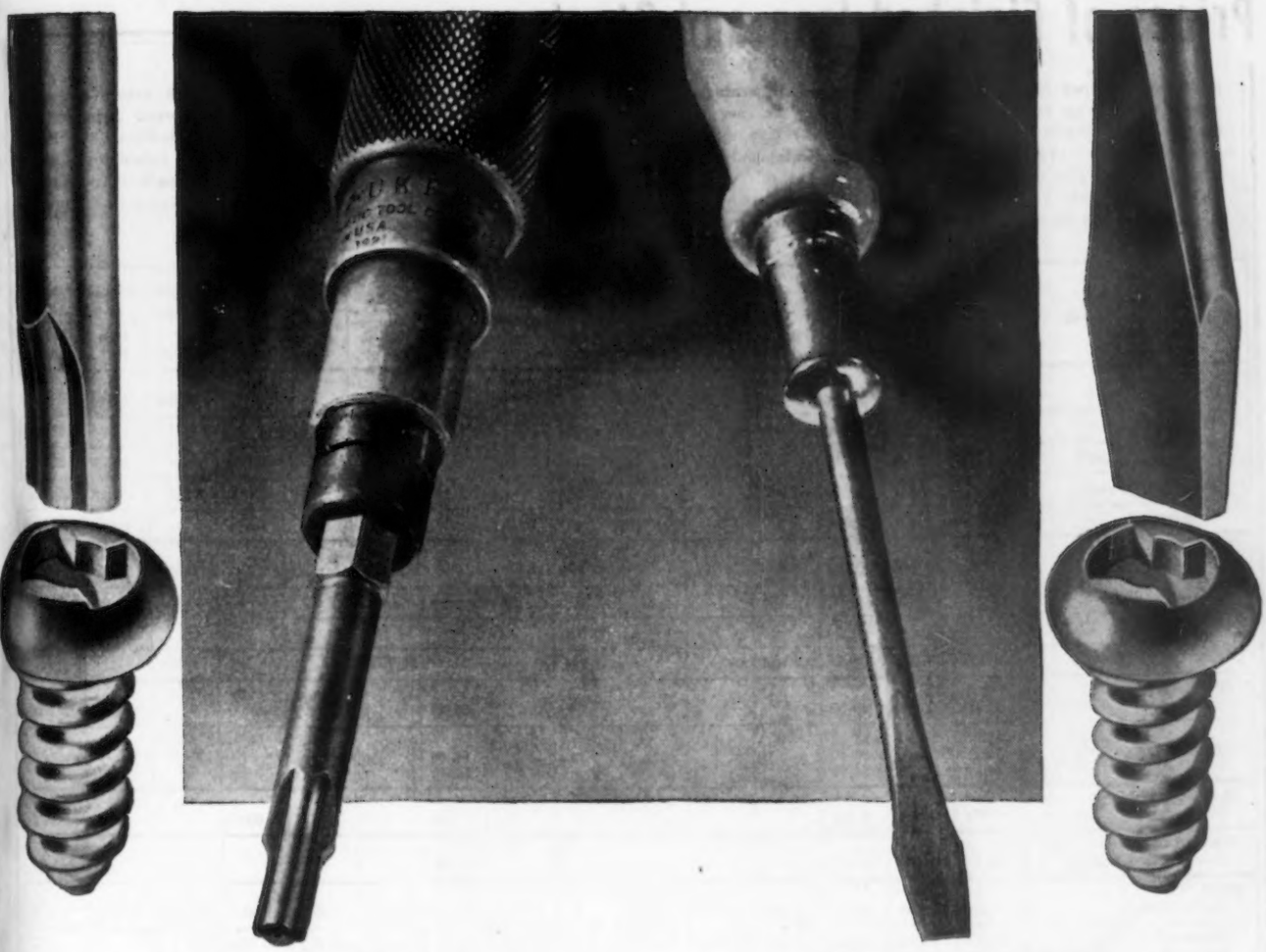
	FINISHED STEEL	PIG IRON	SCRAP STEEL
June 26, 1945	2.41571c. a Lb.	$24.61 a Gross Ton	$19.17 a Gross Ton
One week ago	2.41571c. a Lb.	$24.61 a Gross Ton	$19.17 a Gross Ton
One month ago	2.38444c. a Lb.	$24.61 a Gross Ton	$18.92 a Gross Ton
One year ago	2.30837c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton

	FINISHED STEEL HIGH	FINISHED STEEL LOW	PIG IRON HIGH	PIG IRON LOW	SCRAP STEEL HIGH	SCRAP STEEL LOW
1945	2.41571c., May 29	2.21189c., Jan. 2	$24.61, Feb. 20	$23.61, Jan. 2	$19.17	$19.17
1944	2.30837c., Sept. 5	2.21189c., Oct. 5	$23.61	$23.61	19.17	$15.67, Oct. 24
1943	2.25513c.	2.25513c.	23.61	23.61	19.17	19.17
1942	2.26190c.	2.26190c.	23.61	23.61	19.17	19.17
1941	2.43078c.	2.43078c.	$23.61, Mar. 20	$23.45, Jan. 2	$22.00, Jan. 7	$19.17, Apr. 10
1940	2.30467c., Jan. 2	2.24107c., Apr. 16	23.45, Dec. 23	22.61, Jan. 2	21.83, Dec. 30	16.04, Apr. 9
1939	2.35367c., Jan. 3	2.26689c., May 16	22.61, Sept. 19	20.61, Sept. 12	22.50, Oct. 3	14.08, May 16
1938	2.58414c., Jan. 4	2.27207c., Oct. 18	23.25, June 21	19.61, July 6	15.00, Nov. 22	11.00, June 7
1937	2.58414c., Mar. 9	2.32263c., Jan. 4	23.25, Mar. 9	20.25, Feb. 16	21.92, Mar. 30	12.67, June 8
1936	2.32263c., Dec. 28	2.05200c., Mar. 10	19.74, Nov. 24	13.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935	2.07642c., Oct. 1	2.06492c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, Apr. 29
1934	2.15367c., Apr. 24	1.95757c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	1.95578c., Oct. 3	1.75836c., May 2	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.89196c., July 5	1.83901c. Mar. 1	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	1.99626c., Jan. 13	1.86586c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.25488c., Jan. 7	1.97319c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.31773c., May 28	2.26498c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 per cent of the United States output. Index recapitulated in Aug. 28, 1941, issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.



TYPE "A" POWER BIT FOR

SAFER, FASTER, LOWER COST ASSEMBLY

AN EASY-TO-HIT TARGET. The visibility of CLUTCH HEAD'S wide roomy recess substitutes operator confidence for slow-down hesitation. Saves "breaking-in" period.

NO DRIVER CANTING. The Center Pivot column guides the bit directly into full-depth dead-center entry. Makes straight driving automatic.

NO "CHEWED-UP" HEADS to stop or slow up the line. Definite grip also protects manpower and material against slippage.

NO RIDE-OUT TENDENCY. With CLUTCH HEAD the driving contact of bit and recess walls is all-square. No "kick-out" as in tapered driving. Disposes of end pressure as a fatigue factor and slippage hazard.

EFFORTLESS DRIVING steps up speed for smoother, higher production. Checks out end-of-the-shift lagging.

DRIVE EXTRA THOUSANDS OF SCREWS with the rugged Type "A" Bit . . . without interruption for tool change.

NEW BIT LIFE IN 60 SECONDS. No back-to-the-factory shipment. Simple 60-second application of the end surface to a grinding wheel restores this bit to original efficiency.

THE COMMON SCREWDRIVER FOR

SIMPLIFIED FIELD SERVICING

THE ONLY MODERN SCREW on the market that is basically designed for operation with a common screwdriver.

FIELD SERVICE "HEADACHES" ELIMINATED. No time wasted hunting special tools. No needless multiple tool expense.

WIDTH THE ONLY FACTOR. The only requirement is that the screwdriver blade be reasonably accurate in width. Thickness of the blade is secondary.

CUTS NON-OPERATING TIME. This simplified servicing expedites adjustments in the field to keep your product in consistent operation . . . an important selling point to users.

TYPE "A" HAND DRIVERS TOO. The same rugged bit is available for field service. While not essential, this bit has special advantages found in no other similar tool.

THE CLUTCH HEAD LOCK-ON enables service men to withdraw screws undamaged and saved for re-use, the reverse action securely locking the screw to the end of the Type "A" Bit. The same Lock-On feature operates in replacing screws, permitting of easy one-handed reaching to hard-to-get-at spots . . . frequently saving disassembling of surrounding units.

CLUTCH HEAD SCREWS

Investigate what these exclusive CLUTCH HEAD *features mean to you in reconversion. Write for details, illustrated Brochure, package assortment of screws, and sample Type "A" Bit.*

UNITED SCREW AND BOLT CORPORATION

CHICAGO 8 CLEVELAND 2 NEW YORK 7

Prices of Finished Iron and Steel . . .

Steel prices shown here are f.o.b. basing points, in cents per lb. unless otherwise indicated. Extras apply. Delivered prices do not reflect 3% tax on freight. (1) Mill run sheet, 10c. per 100 lb. under base; primes, 25c. above base. (2) Unassorted commercial coating. (3) Widths up to 12-in. inclusive. (4) 0.25 carbon and less. (5) Applies to certain width and length limitations. (6) For merchant trade. (7) For straight length material only from producer to consumer. Discount of 25c. per 100 lb. to fabricators. (8) Also shafting. For quantities of 20,000 to 29,999 lb. (9) Carload lot in manufacturing trade. (10) Prices do not apply if rail and water is not used. (11) Boxed. (12) This base price for annealed, bright finish wires, commercial spring wire. (13) Produced to dimensional tolerances in AISI Manual Sect. 6. For price exceptions to finished and semi-finished steels turn two pages.

Basing Point / Product	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio	Gulf Ports, Cars	Pacific Ports, Cars [10]	DELIVERED TO Detroit	New York	Philadelphia
SHEETS															
Hot rolled	2.20¢	2.20¢	2.20¢	2.20¢	2.20¢	2.20¢	2.20¢	2.20¢	2.30¢	2.20¢		2.75¢	2.30¢	2.44¢	2.37¢
Cold rolled [1]	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.15¢	3.39¢	3.37¢
Galvanized (24 gage)	3.70¢	3.70¢	3.70¢		3.70¢	3.70¢	3.70¢	3.70¢	3.80¢	3.70¢		4.25¢		3.94¢	3.87¢
Enameling (20 gage)	3.45¢	3.45¢	3.45¢	3.45¢			3.45¢		3.55¢	3.45¢		4.10¢	3.55¢	3.81¢	3.77¢
Long ternes [2]	3.80¢	3.80¢	3.80¢									4.55¢		4.16¢	4.12¢
STRIP															
Hot rolled [3]	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.20¢	2.46¢	
Cold rolled [4]	2.80¢	2.90¢		2.80¢			2.80¢	(Worcester=3.00¢)					2.90¢	3.16¢	
Cooperage stock	2.20¢	2.20¢			2.20¢		2.20¢							2.56¢	
Commodity C-R	2.95¢	3.05¢		2.95¢			2.95¢	(Worcester=3.35¢)					3.05¢	3.31¢	
TIN PLATE															
Standard cokes, base box	$5.00	$5.00	$5.00						$5.10					5.36¢	5.32¢
Electro, box 0.25 lb.	$4.35	$4.35	$4.35						$4.60						
Electro, box 0.50 lb.	$4.50	$4.50	$4.50						$4.60						
Electro, box 0.75 lb.	$4.65		$4.65						$4.75						
BLACK PLATE															
29 gage [5]	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢[11]			3.37¢
TERNES, MFG.															
Special coated, base box	$4.30	$4.30	$4.30						$4.40						
BARS															
Carbon steel	2.25¢	2.25¢	2.25¢	2.25¢	2.25¢	2.25¢		(Duluth=2.35¢)			2.60¢	2.90¢	2.35¢	2.59¢	2.57¢
Rail steel [6]	2.25¢	2.25¢	2.25¢	2.25¢	2.25¢	2.25¢					2.60¢	2.90¢			
Reinforcing (billet) [7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.50¢	2.55¢	2.25¢	2.39¢	
Reinforcing (rail) [7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢				2.50¢	2.55¢	2.25¢		2.47¢
Cold finished [8]	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢			(Detroit=2.70¢)		(Toledo=2.80¢)			2.99¢	2.97¢
Alloy, hot rolled	2.70¢	2.70¢				2.70¢		(Bethlehem, Massillon, Canton=2.70¢)					2.80¢		
Alloy, cold drawn	3.35¢	3.35¢	3.35¢	3.35¢		3.35¢							3.45¢		
PLATES								(Coatesville and Claymont=2.25¢)							
Carbon steel [13]	2.25¢	2.25¢	2.25¢	2.25¢	2.25¢		2.25¢	2.25¢			2.60¢	2.80¢	2.47¢	2.44¢	2.30¢
Floor plates	3.50¢	3.50¢									3.85¢	4.15¢		3.88¢	3.82¢
Alloy	3.50¢	3.50¢			(Coatesville=3.50¢)						3.95¢	4.15¢		3.70¢	3.50¢
SHAPES															
Structural	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢		(Bethlehem=2.10¢)			2.45¢	2.75¢		2.27¢	2.215¢
SPRING STEEL, C-R															
0.26 to 0.50 Carbon	2.80¢			2.80¢			(Worcester=3.00¢)								
0.51 to 0.75 Carbon	4.30¢			4.30¢			(Worcester=4.50¢)								
0.76 to 1.00 Carbon	6.15¢			6.15¢			(Worcester=6.35¢)								
1.01 to 1.25 Carbon	8.35¢			8.35¢			(Worcester=8.55¢)								
WIRE [9]															
Bright [12]	2.75¢	2.75¢		2.75¢	2.75¢		(Worcester=2.85¢)			(Duluth=2.80¢)		3.25¢			3.07¢
Galvanized	Add proper size extra and galvanizing extra to Bright Wire base														
Spring (High Carbon)	3.35¢	3.35¢		3.35¢			(Worcester=3.45¢)					3.85¢			3.67¢
PILING															
Steel Sheet	2.40¢	2.40¢				2.40¢						2.95¢			2.72¢

SEMI-FINISHED STEEL

Ingots, Carbon, Rerolling

Base per gross ton, f.o.b. mill.... $31.00

Ingots, Carbon, Forging

Base per gross ton, f.o.b. Birmingham, Buffalo, Chicago, Cleveland, Gary, Pittsburgh, Youngstown $36.00

Ingots, Alloy

Base per gross ton, f.o.b. Bethlehem, Buffalo, Canton, Coatesville, Chicago, Massillon, Pittsburgh $45.00

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (rerolling only). Prices delivered Detroit are $2.00 higher; delivered E. Michigan, $3 higher; f.o.b. Duluth, billets only, $2.00 higher; billets f.o.b. Pacific ports are $12 higher. Provo, $11.20 higher. Delivered prices do not reflect three per cent tax on freight rates.

Per Gross Ton

Rerolling $36.00
Forging quality 42.00

Alloy Billets, Blooms, Slabs

Pittsburgh, Chicago, Canton, Massillon, Buffalo or Bethlehem, per gross ton $54.00

Price delivered Detroit $2.00 higher; East Michigan, $3.00 higher.

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point.

Per Gross Ton

Open hearth or bessemer $36.00

PRICES

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	1.90c.

Wire Rods

(*No. 5 to 9/32 in.*)

	Per Lb.
Pittsburgh, Chicago, Cleveland	2.15c.
Worcester, Mass.	2.25c.
Birmingham	2.15c.
San Francisco	2.65c.
Galveston	2.40c.

9/32 in. to 47/64 in., 0.15c. a lb. higher. Quantity extras apply.

Shell Steel

	Per Gross Ton
1 in. to 12 in.	$52.00
12 in. to 18 in.	54.00
18 in. and over	56.00

Basic open hearth shell steel, f.o.b. Pittsburgh, Chicago, Buffalo, Gary, Cleveland, Youngstown and Birmingham.

Prices delivered Detroit are $2.00 higher; East Michigan, $3 higher.

Price Exceptions: Follansbee Steel Corp. permitted to sell at $13.00 per gross ton, f.o.b. Toronto, Ohio, above base price of $52.00.

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting, or quantity.

RAILS, TRACK SUPPLIES

(*F.o.b. Mill*)

Standard rails, heavier than 60 lb., No. 1 O.H., gross ton	$43.00
Angle splice bars, 100 lb.	2.70
(*F.o.b. Basing Points*)	*Per Gross Ton*
Light rails (from billets)	$45.00
Light rails (from rail steel)	44.00
	Base per Lb.
Cut spikes	3.25c.
Screw spikes	5.40c.
Tie plate, steel	2.30c.
Tie plates, Pacific Coast	2.45c.
Track bolts	4.75c.
Track bolts, heat treated, to railroads	5.00c.
Track bolts, jobbers discount	63-5

Basing points, light rails, Pittsburgh, Chicago, Birmingham; cut spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo. Cut spikes alone—Youngstown, Lebanon, Pa., Richmond, Oregon and Washington ports, add 25c.

TOOL STEEL

(*F.o.b. Pittsburgh, Bethlehem, Syracuse*)

	Base per lb.
High speed	67c.
Straight molybdenum	54c.
Tungsten-molybdenum	57½c.
High-carbon-chromium	43c.
Oil hardening	24c.
Special carbon	22c.
Extra carbon	18c.
Regular carbon	14c.

Warehouse prices east of Mississippi are 2c. a lb. higher; west of Mississippi ½ higher.

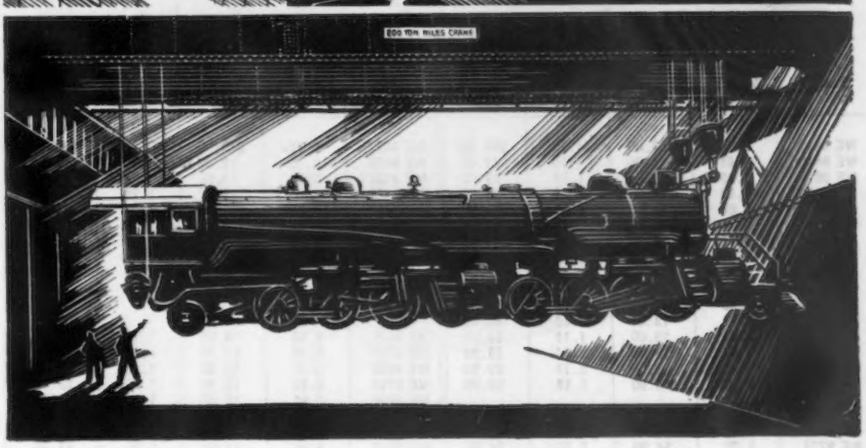
WIRE PRODUCTS

To the trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham, Duluth

	Basing Points Named	*Pacific Coast Basing Points†*
	Base per Keg	
Standard wire nails	$2.90	$3.40
Coated nails	2.90	3.40
Cut nails, carloads	3.85	....
	Base per 100 Lb.	
Annealed fence wire	$3.05	$3.55
Annealed galv. fence wire	3.40	3.90
	Base Column	
Woven wire fence*	67	85
Fence posts, carloads	69	86
Single loop bale ties	66	91
Galvanized barbed wire**	72	82
Twisted barbless wire	72	....

*15½ gage and heavier. **On 80-rod spools in carload quantities.

†Prices subject to switching or transportation charges.



Whatever the load or the need, there is a Shepard Niles Crane precisely suited to every task. The cranes are of all types: overhead traveling, grab bucket, transfer, inner-running trolley, single I-beam, ice-plant, gantry, jib and bracket.

Shepard Niles Cranes feature the "Balanced Drive" (planetary gear) Trolley, dust, fume and moisture-proof housings, automatic oil-bath lubrication, permanent alignment and extremely accurate control of every motion.

Shepard Niles
CRANE & HOIST CORPORATION

Ask the Shepard Niles representative in your locality how best to solve your material handling problem. Or, write directly to Shepard Niles.

356 SCHUYLER AVE. • MONTOUR FALLS, N. Y.

WAREHOUSE PRICES

Delivered metropolitan areas per 100 lb. These are zoned warehouse prices in conformance with latest zoning amendment to OPA Price Schedule 49.

Cities	SHEETS			STRIP		Plates ¼ in. and heavier	Structural Shapes	BARS		ALLOY BARS			
	Hot Rolled (10 gage)	Cold Rolled	Galvanized (24 gage)	Hot Rolled	Cold Rolled			Hot Rolled	Cold Finished	Hot Rolled, NE 8617-20	Hot Rolled, NE 9442-45 Ann.	Cold Drawn, NE 8617-20	Cold Drawn, NE 9442-45 Ann.
**Philadelphia	$3.518	$4.872[6]	$5.158[a]	$3.922	$4.772	$3.605	$3.666	$3.822	$4.072	$5.968	$7.066	$7.272	$8.322
New York	3.59	4.613[2]	5.110	3.974[6]	4.772	3.768	3.758	3.853	4.103	5.858	6.908	7.103	8.209
Boston	3.744	4.744[9]	5.224[9]	4.108	4.718	3.912	3.912	4.044	4.144	6.162	7.262	7.344	8.394
Baltimore	3.394	4.552	4.894	3.902	4.752	3.594	3.759	3.502	4.052	....	....	....	....
Norfolk	3.771	4.966	5.371	4.166	4.966	3.971	4.002	4.066	4.166	....	....	....	....
Chicago	3.25	4.20	5.231	3.60	4.65[17]	3.55	3.55	3.50	3.75	5.75	6.85	6.85	7.90
Milwaukee	3.387	4.337[3]	5.272[4]	3.737	4.787[17]	3.687	3.687	3.637	3.887	5.987	7.087	7.087	8.137
Cleveland	3.35	4.40	4.877[4]	3.60	4.45	3.40	3.588	3.35	3.75	5.956	7.056	6.85	7.90
Buffalo	3.35	4.40	4.754	3.819	4.669	3.63	3.40	3.35	3.75	5.75	6.85	6.85	7.90
Detroit	3.45	4.50	5.004	3.70	4.859[17]	3.609	3.661	3.45	3.80	6.08	7.18	7.159	8.209
Cincinnati	3.425	4.475[3]	4.825[5]	3.575	4.711	3.511	3.591	3.511	4.011	....	....	....	....
St. Louis	3.397	4.347[3]	5.172[4]	3.747	4.931[17]	3.697	3.697	3.647	4.031	6.131	7.231	7.231	8.281
Pittsburgh	3.35	4.40	4.75	3.60	4.45	3.40	3.40	3.35	3.75	5.75	6.85	6.85	7.90
St. Paul	3.51	4.48	5.257[4]	3.86	4.36[17]	3.811[3]	3.811[3]	3.761[3]	4.361	6.09	7.19	7.561	8.711
Omaha	3.865	5.443	5.608[4]	4.215	....	4.165	4.165	4.115	4.43	....	....	....	....
Indianapolis	3.518	4.568	4.548	3.768	4.741	3.63	3.63	3.58	3.98	6.08	7.18	7.18	8.23
Birmingham	3.45	....	4.75	3.70	....	3.55	3.55	3.50	4.43	....	....	....	....
Memphis	3.965[7]	4.66	3.265	4.215	....	4.065	4.065	4.015	4.33	....	....	....	....
New Orleans	4.058*	4.98	5.358	4.308	....	4.158	4.158*	4.108*	4.629	....	....	....	....
Houston	3.763	5.573	6.313[1]	4.313	....	4.25	4.25	3.78	6.373[3]	7.223	8.323	8.323	9.373
Los Angeles	4.10	7.20[3]	6.10[4]	4.95	5.61[318]	4.95	4.65	4.40	5.583	8.304	9.404	9.404	10.454
San Francisco	4.55[14]	7.30[4]	6.35[4]	4.50[14]	7.33[17]	4.65[14]	4.35[14]	4.15[14]	5.333	8.304	9.404	9.404	10.454
Seattle	4.65[12]	7.08[4]	5.95[4]	4.25[12]	....	4.75[12]	4.45[12]	4.35[12]	5.783	....	9.404	....	....
Portland	4.65[11]	8.80[4]	5.75[4]	4.75[11]	....	4.85[11]	4.45[11]	4.45[11]	5.533	8.304	9.404	8.304	9.404
Salt Lake City	4.530[17]	....	6.17[13]	5.53[17]	....	4.98[17]	4.98[17]	4.88[17]	5.90	....	....	....	....

National Emergency Steels

MILL EXTRAS

Designation	Basic Open-Hearth		Electric Furnace		Designation	Basic Open-Hearth		Electric Furnace	
	Bars and Bar-Strip	Billets, Blooms, and Slabs	Bars and Bar-Strip	Billets, Blooms, and Slabs		Bars and Bar-Strip	Billets, Blooms, and Slabs	Bars and Bar-Strip	Billets, Blooms, and Slabs
NE 8612	0.65¢	$13.00	$1.15	$23.00	NE 9427	0.75¢	$15.00	$1.25	$25.00
NE 8615	0.65	13.00	1.15	23.00	NE 9430	0.75	15.00	1.25	25.00
NE 8617	0.65	13.00	1.15	23.00	NE 9432	0.75	15.00	1.25	25.00
NE 8620	0.65	13.00	1.15	23.00	NE 9435	0.75	15.00	1.25	25.00
NE 8622	0.65	13.00	1.15	23.00	NE 9437	0.75	15.00	1.25	25.00
NE 8625	0.65	13.00	1.15	23.00	NE 9440	0.75	15.00	1.25	25.00
NE 8627	0.65	13.00	1.15	23.00	NE 9442	0.80	16.00	1.30	26.00
NE 8630	0.65	13.00	1.15	23.00	NE 9445	0.80	16.00	1.30	26.00
NE 8632	0.65	13.00	1.15	23.00	NE 9447	0.80	16.00	1.30	26.00
NE 8635	0.65	13.00	1.15	23.00	NE 9450	0.80	16.00	1.30	26.00
NE 8637	0.65	13.00	1.15	23.00					
NE 8640	0.65	13.00	1.15	23.00					
NE 8642	0.65	13.00	1.15	23.00	NE 9722	0.65	13.00	1.15	23.00
NE 8645	0.65	13.00	1.15	23.00	NE 9727	0.65	13.00	1.15	23.00
NE 8647	0.65	13.00	1.15	23.00	NE 9732	0.65	13.00	1.15	23.00
NE 8650	0.65	13.00	1.15	23.00	NE 9737	0.65	13.00	1.15	23.00
					NE 9742	0.65	13.00	1.15	23.00
					NE 9745	0.65	13.00	1.15	23.00
NE 8712	0.70	14.00	1.20	24.00	NE 9747	0.65	13.00	1.15	23.00
NE 8715	0.70	14.00	1.20	24.00	NE 9750	0.65	13.00	1.15	23.00
NE 8717	0.70	14.00	1.20	24.00	NE 9763	0.65	13.00	1.15	23.00
NE 8720	0.70	14.00	1.20	24.00	NE 9768	0.65	13.00	1.15	23.00
NE 8722	0.70	14.00	1.20	24.00					
NE 8725	0.70	14.00	1.20	24.00					
NE 8727	0.70	14.00	1.20	24.00	NE 9830	$1.36	26.00	1.90	36.00
NE 8730	0.70	14.00	1.20	24.00	NE 9832	1.30	26.00	1.80	36.00
NE 8732	0.70	14.00	1.20	24.00	NE 9835	1.30	26.00	1.80	36.00
NE 8735	0.70	14.00	1.20	24.00	NE 9837	1.30	26.00	1.80	36.00
NE 8737	0.70	14.00	1.20	24.00	NE 9840	1.30	26.00	1.80	36.00
NE 8740	0.70	14.00	1.20	24.00	NE 9842	1.30	26.00	1.80	36.00
NE 8742	0.70	14.00	1.20	24.00	NE 9845	1.30	26.00	1.80	36.00
NE 8745	0.70	14.00	1.20	24.00	NE 9847	1.30	26.00	1.80	36.00
NE 8747	0.70	14.00	1.20	24.00	NE 9850	1.30	26.00	1.80	36.00
NE 8750	0.70	14.00	1.20	24.00					
					NE 9912	1.20	24.00	1.55	31.00
NE 9415	0.75	15.00	1.25	25.00	NE 9915	1.20	24.00	1.55	31.00
NE 9417	0.75	15.00	1.25	25.00	NE 9917	1.20	24.00	1.55	31.00
NE 9420	0.75	15.00	1.25	25.00	NE 9920	1.20	24.00	1.55	31.00
NE 9422	0.75	15.00	1.25	25.00	NE 9922	1.20	24.00	1.55	31.00
NE 9425	0.75	15.00	1.25	25.00	NE 9925	1.20	24.00	1.55	31.00

Note 1: The ranges shown are restricted to sizes 100 sq. in. or less or equivalent cross-sectional area 18 in. wide or under, with a maximum individual piece weight of 7000 lb. irrespective of size. **Note 2:** For steels ordered to such ranges, below the size and weight restriction, the average of all the chemical checks must be within the limits specified subject to check analysis variations given in Table 4, Section 10, AISI Steel Products Manual. **Note 3:** When acid open-hearth is specified and acceptable, add to basic open-hearth alloy differential 0.25c. per lb. for bars and bar strip and $5 per gross ton for billets, blooms and slabs. **Note 4:** The extras shown are in addition to the base price of $2.70 for 100 lb. on finished products and $54 per gross ton on semi-finished steel, major basing points, and are in cents per pound when applicable to bars and bar-strip and in dollars per gross ton when applicable to billets, blooms and slabs. The full extra applicable over the base price is the total of all extras indicated by the specific requirements of the order. The higher extra shall be charged for any size falling between two published extras.

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD ROLLED: Sheets, 400 to 1499 lb.; strip, extras on all quantities; bars, 1500 lb. base; NE alloy bars, 1000 to 39,999 lb.

EXCEPTIONS: (1) 150 to 499 lb. (2) 150 to 1499 lb. (3) 400 to 1499 lb. (4) 450 to 1499 lb. (5) 500 to 1499 lb. (6) 0 to 199 lb. (7) 400 to 1499 lb. (8) 1000 to 1999 lb. (9) 450 to 3749 lb. (10) 400 to 3999 lb. (11) 300 to 4999 lb. (12) 300 to 10,000 lb. (13) 400 to 14,999 lb. (14) 400 lb. and over. (15) 1000 lb. and over. (16) 1500 lb. and over. (17) 2000 lb. and over. (18) 3500 lb. and over.

(a) Philadelphia: Galvanized sheet, 25 or more bundles.

Extra for size, quality, etc., apply on above quotations.

*Add 0.271c. for sizes not rolled in Birmingham.

**City of Philadelphia only. Applicable freight rates must be added to basing point prices to obtain delivered price to other localities in metropolitan area.

LAKE SUPERIOR ORES

(51.50% *Fe, Natural Content, Delivered Lower Lake Ports**)

	Per Gross Ton
Old range, bessemer, 51.50	$4.75
Old range, non-bessemer, 51.50	4.60
Mesaba, bessemer, 51.50	4.60
Mesaba, non-bessemer, 51.50	4.45
High phosphorus, 51.50	4.35

*Adjustments are made to indicate prices based on variance of Fe content of ores as analyzed on a dry basis by independent laboratories.

FLUORSPAR

Maximum price f.o.b. consumer's plant, $30 per short ton plus either (1) rail freight from producer to consumer, or (2) rail freight from Rosiclare, Ill., to consumer, whichever is lower.

Exception

When the WPB Steel Division certifies in writing the consumer's need for one of the higher grades of metallurgical fluorspar specified in the table below the price shall be taken from the table plus items (1 and 2) from paragraph above.

Effective CaF_2 Content:	*Base price per short ton*
70% or more	$33.00
65% but less than 70%	32.00
60% but less than 65%	31.00
Less than 60%	$0.00

PRICES

WELDED PIPE AND TUBING

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills
(F.o.b. Pittsburgh only on wrought pipe)
Base Price—$200.00 per Net Ton

	Black	Galv.
Steel (Butt Weld)		
⅛ in.	63½	51
¼ in.	66½	55
⅜ to 3 in.	68½	57½
Wrought Iron (Butt Weld)		
⅛ in.	24	3½
¼ in.	30	10
⅜ and 1¼ in.	34	16
1½ in.	38	18½
2 in.	37½	18
Steel (Lap Weld)		
1 in.	61	49½
1½ in. and 3 in.	64	52½
3½ to 6 in.	66	54½
Wrought Iron (Lap Weld)		
2 in.	30½	12
2½ to 3½ in.	31½	14½
4 in.	33½	18
4½ to 8 in.	32½	17
Steel (Butt, extra strong, plain ends)		
⅛ in.	61½	50½
¼ in.	65½	54½
⅜ to 3 in.	67	57
Wrought Iron (Same as Above)		
⅛ in.	25	6
¼ in.	31	12
⅜ to 2 in.	38	19½
Steel (Lap, extra strong, plain ends)		
1 in.	59	48½
1½ and 3 in.	63	52½
3½ to 6 in.	66½	56
Wrought Iron (Same as Above)		
2 in.	33½	15½
2½ to 4 in.	39	23½
4½ to 6 in.	37½	21

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or $2 a ton higher on all butt weld.

CAST IRON WATER PIPE

	Per Net Ton
6-in. and larger, del'd Chicago	$54.80
6-in. and larger, del'd New York	52.10
6 in. and larger, Birmingham	46.00
6-in. and larger f.o.b. cars, San Francisco or Los Angeles	69.40
6-in. and larger f.o.b. cars, Seattle	71.20

Class "A" and gas pipe, $3 extra; 4-in. pipe is $3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons or over, 6-in. and larger are $46 at Birmingham and $53.80 delivered Chicago, $59.40 at San Francisco and Los Angeles, and $70.20 at Seattle. Delivered prices do not reflect new 3 per cent tax on freight rates.

BOILER TUBES

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes, Minimum Wall. Net base prices per 100 ft. f.o.b. Pittsburgh, in carload lots.

	Seamless Cold Drawn	*Seamless Hot Rolled*	*Lap Weld, Hot Rolled*
2 in. o.d. 13 B.W.G.	15.03	13.04	12.38
2½ in. o.d. 12 B.W.G.	20.21	17.54	16.58
3 in. o.d. 12 B.W.G.	22.48	19.50	18.35
3½ in. o.d. 11 B.W.G.	28.37	24.62	23.15
4 in. o.d. 10 B.W.G.	35.20	30.54	28.66

(Extras for less carload quantities)

40,000 lb. or ft. and over	Base
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 29,999 lb. or ft.	10%
10,000 lb. or ft. to 19,999 lb. or ft.	20%
5,000 lb. or ft. to 9,999 lb. or ft.	30%
2,000 lb. or ft. to 4,999 lb. or ft.	45%
Under 2,000 lb. or ft.	65%

Keeping
Steel Castings
quality at **Par**

The use *of only the highest grade scrap and pig iron obtainable goes a long way toward keeping the quality of Strong casting steel up to par. Beyond that, this quality is further safeguarded by the constant vigilance of the laboratory.*

Each heat is subjected to rigid chemical and temperature checks during the refining process and a running record is kept of the chemical and physical properties of every melt.

Only from trouble-free steel can trouble-free castings be made.

STRONG IN NAME
STRONG IN FACT

STRONG STEEL FOUNDRY COMPANY, BUFFALO, N.Y.

Strong

TENSILE STRENGTH · ELONGATION

GET SET NOW!

● Force measuring and weighing apparatus has taken day-and-night punishment in this war. Even the best of the war-made equipment will not give prewar performance, in durability and continued accuracy.

Yet invisible losses due to inaccurate control equipment can seriously affect costs, quality standards and profits.

We can help you in planning for weighing, counting, force-measuring, batching, testing and similar control operations. You can save time and loss later if you get set on these matters now. Write for timely information pertinent to your industry. Toledo Scale Company, Industrial Division, Toledo 12, Ohio.

TOLEDO

HEADQUARTERS FOR

SCALES

PRICES

CORROSION AND HEAT-RESISTING STEEL

(Per lb. base price, f.o.b. Pittsburgh)

Chromium-Nickel Alloys

	No. 304	No. 302
Forging billets	21.25c.	20.40c.
Bars	25.00c.	24.00c.
Plates	29.00c.	27.00c.
Structural shapes	25.00c.	24.00c.
Sheets	36.00c.	34.00c.
Hot rolled strip	23.50c.	21.50c.
Cold rolled strip	30.00c.	28.00c.
Drawn wire	25.00c.	24.00c.

Straight-Chromium Alloys

	No. 410	No. 430	No. 442	No. 446
F.Billets	15.725c.	16.15c.	19.125c.	23.375c.
Bars	18.50c.	19.00c.	22.50c.	27.50c.
Plates	21.50c.	22.00c.	25.50c.	30.50c.
Sheets	26.50c.	29.00c.	32.50c.	36.50c.
Hot strip	17.00c.	17.50c.	24.00c.	35.00c.
Cold strip	22.00c.	22.50c.	32.00c.	52.00c.

Chromium-Nickel Clad Steel (20%)

	No. 304
Plates	18.00c.*
Sheets	19.00c.

*Includes annealing and pickling.

REFRACTORIES

(F.o.b. Works)

Fire Clay Brick

	Per 1000
Super-duty brick, St. Louis	$68.55
First quality, Pa., Md., Ky., Mo., Ill.	54.45
First quality, New Jersey	59.45
Sec. quality, Pa., Md. Ky., Mo., Ill.	49.40
Sec. quality, New Jersey	54.15
No. 1 Ohio	45.75
Ground fire clay, net ton	8.05

Silica Brick

Pennsylvania and Birmingham	$54.45
Chicago District	62.45
Silica cement, net ton (Eastern)	9.55

Chrome Brick

	Per Net Ton
Standard chemically bonded, Balt., Plymouth Meeting, Chester	$54.00

Magnesite Brick

Standard, Balt. and Chester	$76.00
Chemically bonded, Baltimore	65.00

Grain Magnesite

Domestic, f.o.b. Balt. and Chester in sacks (carloads)	$43.45
Domestic, f.o.b. Chewelah, Wash. (in bulk)	22.00

EXCEPTIONS TO RPS 6

Ingots, carbon, rerolling—Phoenix Iron Co. may charge $38.75; Kaiser Co., $43.00 f.o.b. Pacific Coast ports; Empire Sheet & Tinplate Co., $34.25; Pgh. Steel Co., $33.10.

Ingots, carbon, forging—Phoenix Iron Co. may charge $43.00; Empire Sheet & Tinplate Co., $39.25, f.o.b. Mansfield, Ohio; West Coast producers, $48.00, f.o.b. Pacific Coast Ports; Pgh. Steel Co., $38.10.

Ingots, alloy—C/l delivered Detroit add $2.00; delivered East Michigan add $3.00. Connors Steel Co. may charge $45.00 f.o.b. Birmingham.

Slabs, per gross ton—Andrews Steel Co. $41 basing pts.; Wheeling Steel Corp. (rerolling) 4 in. sq. or larger $37.75 f.o.b. Portsmouth, Ohio; Empire Sheet & Tin Plate Corp. $41; Phoenix Iron Co. (rerolling) $41, (forging) $47; Granite City Steel $47.50; Kaiser Co., (rerolling) $58.64, (forging) $64.64, f.o.b. Los Angeles.

Blooms, per gross ton—Phoenix Iron Co. (rerolling) $41; (forging) $47; Pgh. Steel Co. (rerolling) $38.25, (forging) $44.25; Wheeling Steel Corp. (rerolling) 4 in. sq. or larger $37.75 f.o.b. Portsmouth; Kaiser Co. (rerolling) $58.64, (forging) $64.64 (shell steel) $74.64 f.o.b. Los Angeles.

Sheet Bar, per gross ton—Empire Sheet & Tinplate Co. $39 mill; Wheeling Steel Corp. $38 Portsmouth, Ohio.

Billets, Forging, per gross ton—Andrews Steel Co. $50 basing pts.; Follansbee Steel Corp. $49.50 Toronto, Ohio; Phoenix Iron Co. $47 mill; Geneva Steel Co. $64.64 f.o.b. Pacific Coast; Pittsburgh Steel Co. $49.50; Kaiser Co. $64.64, (shell steel) $74.64, f.o.b. Los Angeles.

PRICES

Billets, Rerolling, per gross ton—Continental Steel Corp. may charge Acme Steel in Chicago switching area $34 plus freight from Kokomo, Ind.; Northwestern Steel & Wire Co. (Lend-Lease) $41 mill; Wheeling Steel Corp. 4 in. sq. or larger $37.75, smaller $39.50 f.o.b. Portsmouth, Ohio; Stanley Works may sell Washburn Wire Co. under allocation at $39 Bridgeport, Conn.; Keystone Steel & Wire Co. may sell Acme Steel Co. at Chicago base, f.o.b. Peoria; Phoenix Iron Co. $41 mill; Continental Steel Corp. (1¾ x 1¾) $39.50, (2 x 2) $40.60 Kokomo, Ind. (these prices include $1 size extra); Keystone Steel & Wire Co. $36.40 Peoria; Connors Steel Co. $50.60 Birmingham; Ford Motor Co. $34 Dearborn, Mich.; Geneva Steel Co. $58.64 f.o.b. Pacific Coast; Pgh. Steel Co. $43.50; Kaiser Co. $58.64 f.o.b. Los Angeles.

Structural Shapes—Phoenix Iron Co. 2.35c. basing pts. (export) 2.50c. Phoenixville; Knoxville Iron Co. 2.30c. basing points; Kaiser Co. 3.20c. f.o.b. Los Angeles.

Rails, per gross ton—Sweet Steel Co. (rail steel) $50 mill; West Virginia Rail Co. (lightweight) on allocation based Huntington, W. Va.; Colorado Fuel & Iron, $45 Pueblo.

Hot Rolled Plate—Granite City Steel Co. 2.65c. mill; Knoxville Iron Co. 2.25c. basing pts.; Kaiser Co. and Geneva Steel Co. 3.20c. Pacific Ports; Central Iron and Steel Co. 2.50c. basing points; Granite City Steel Co. 2.35c. Granite City.

Merchant Bars—W. Ames Co., 10 tons and over, 2.85c. mill; Eckels-Nye Steel Corp. 2.50c. basing pts. (rail steel) 2.40c.; Phoenix Iron Co. 2.40c. basing pts.; Sweet Steel Co. (rail steel) 2.33c. mill; Joslyn Mfg. & Supply Co., 2.35c. Chicago; Calumet Steel Div., Borg Warner Corp. (8 in. mill bar), 2.35c. Chicago; Knoxville Iron Co., 2.30c. basing pts.; Laclede Steel Co., sales to LaSalle Steel granted Chicago base, f.ob Madison, Ill.; Milton Mfg. Co., 2.75c. f.o.b. Milton, Pa.

Pipe Skelp—Wheeling Steel, Benwood, 2.05c.

Reinforcing Bars—W. Ames & Co., 10 tons and over, 2.85c. mill; Sweet Steel Co. (rail steel), 2.33c. mill; Columbia Steel Co., 2.50c. Pacific Ports.

Cold Finished Bars—Keystone Drawn Steel Co. on allocation, Pittsburgh c.f. base plus c/l freight on hot rolled bars Pittsburgh to Spring City, Pa.; New England Drawn Steel Co. on allocation outside New England, Buffalo c.f. base plus c/l freight Buffalo to Mansfield, Mass., f.o.b. Mansfield; Empire Finished Steel Corp. on allocation outside New England, Buffalo c.f. base plus c/l freight Buffalo to plants, f.o.b. plant; Compressed Steel Shafting Co. on allocation outside New England, Buffalo base plus c/l freight Buffalo to Readville, Mass., f.o.b. Readville; Medart Co. in certain areas, Chicago c.f. base plus c/l freight Chicago to St. Louis, f.o.b. St. Louis.

Alloy Bars—Texas Steel Co., for delivery except Texas and Okla., Chicago base, f.o.b. Fort Worth, Tex.; Connors Steel Co., shipped outside Ala., Mississippi, Louisiana, Georgia, Florida, Tenn., Pittsburgh base, f.o.b. Birmingham.

Hot Rolled Strip—Joslyn Mfg. & Supply Co., 2.30c. Chicago; Knoxville Iron Co., 2.25c. basing pts.

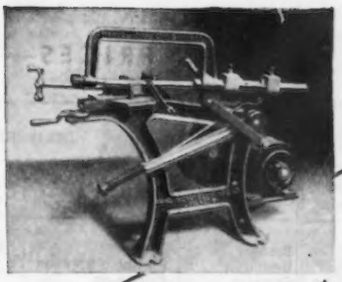
Hot Rolled Sheets—Andrews Steel Co., Middletown base on shipments to Detroit or area; Parkersburg Iron & Steel, 2.25c. Parkersburg.

Galvanized Sheets—Andrews Steel Co. 3.75c. basing pts.; Parkersburg Iron & Steel Co., 3.85c. Parkersburg; Continental Steel Co., Middletown base on Kokomo, Ind., product; Superior Sheet Steel Co., Pittsburgh base except for Lend-Lease.

Pipe and Tubing—South Chester Tube Co. when priced at Pittsburgh, freight to Gulf Coast and Pacific Ports may be charged from Chester, Pa., also to points lying west of Harrisburg, Pa.

Black Sheets—Empire Sheet and Tinplate Co., maximum base price mill is 2.45c. per 100 lb., with differentials, transportation charges, etc., provided in RPS. No. 6.

Wire Products—Pittsburgh Steel Co., f.o.b. Pittsburgh, per 100 lb., rods, No. 5 to 9/32 in., 2.20c.; rods, heavier than 9/32, 2.35c.; bright wire, 2.725c.; bright nails, 2.90c.; lead and furnace annealed wire, 2.85c.; pot annealed wire, 2.85c.; galvanized barbed wire, 3.90c.; plain staples, 2.55c.; galvanized staples, 2.65c.; bright spring wire, 3.30c.; galvanized spring wire, 3.45c.



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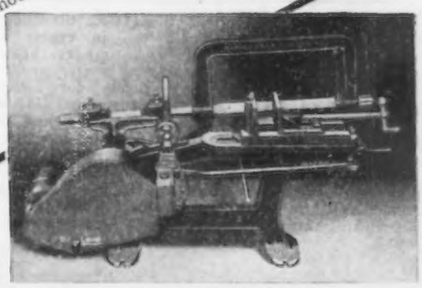
No. 1 Draw Cut Hack Saw Dry cut, 4" x 4" capacity. A sturdy saw well-known for its dependability, economy, and invaluable service in the small shop or shop department. Simple and efficient with low original, maintenance, and blade cost.

MARVEL SAWS

No. 2 Draw Cut Hack Saw. Companion to the No. 1 but with a normal 6" x 6" capacity which can be increased to 8" x 8" by shortening the stroke with adjustable crank. The No. 2 MARVEL also has a swivel vise which is removable from the "T" slotted bed, permitting special fixtures to be mounted. Both machines are available in belt and motor driven models. Motor driven models can also be furnished mounted on portable truck.

Complete Range of Metal Sawing Machines

Being the largest exclusive manufacturer of metal sawing machines and blades, both hack saw and band saw type, we have the correct answer to your cut-off problems. Each MARVEL model has a distinct application, so write us and we will send our catalog, price, and recommendation for the saw to fill your requirements most efficiently. MARVEL sawing engineers are also available to discuss and analyze your cut-off work. (Without obligation of course)



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5700 W. Bloomingdale Ave., Chicago 39, Illinois, U. S. A.

With victory—Johnson production, greatly enhanced through the war, is ready for larger service through general distribution.
Johnson research is prepared to help you with your high carbon steel wire problems.
JOHNSON STEEL & WIRE CO., INC.
WORCESTER 1, MASSACHUSETTS
NEW YORK ATLANTA AKRON CHICAGO LOS ANGELES

PIG IRON PRICES

BASING POINT* BASE PRICES

Basing Point	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Bethlehem	$25.50	$26.00	$26.50	$27.00	.....
Birdsboro	25.50	26.00	26.50	27.00	$30.50
Birmingham	20.00	21.38	.....	26.00	.....
Buffalo	24.00	25.00	25.50	26.00	30.50
Chicago	24.50	25.00	25.00	25.50	.....
Cleveland	24.50	25.00	25.00	25.50	.....
Detroit	24.50	25.00	25.00	25.50	.....
Duluth	25.00	25.50	25.50	26.00	.....
Erie	24.50	25.00	25.50	26.00	.....
Everett	25.50	26.00	26.50	27.00	.....
Granite City	24.50	25.00	25.00	25.50	.....
Hamilton	24.50	25.00	25.00	.....	.....
Neville Island	24.50	25.00	25.00	25.50	.....
Provo	22.50	23.00	.....	.....	.....
Sharpsville [1]	24.50	25.00	25.00	25.50	.....
Sparrows Point	25.50	26.00	.....	.....	.....
Steelton	25.50	.....	.....	.....	30.50
Swedeland	25.50	26.00	26.50	27.00	.....
Toledo	24.50	25.00	25.00	25.50	.....
Youngstown	24.50	25.00	25.00	25.50	.....

DELIVERED PRICES† (BASE GRADES)

Consuming Point	Basing Point	Freight Rate	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Boston	Everett	$ .58	$26.00	$26.50	$27.00	$27.50	.....
Boston	Birdsboro-Steelton	4.02	.....	.....	.....	.....	$34.82
Brooklyn	Bethlehem	2.50	28.00	28.50	29.00	29.50	.....
Brooklyn	Birdsboro	2.92	.....	.....	.....	.....	33.42
Canton	Cleveland	1.39	25.89	26.39	26.39	26.89	.....
Canton	Buffalo	3.19	.....	.....	.....	.....	33.69
Cincinnati	Birmingham	4.06	24.06	25.44	.....	.....	.....
Cincinnati	Hamilton	1.11	.....	.....	26.11	.....	.....
Cincinnati	Buffalo	4.40	.....	.....	.....	.....	34.90
Jersey City	Bethlehem	1.53	27.03	27.53	28.03	28.53	.....
Jersey City	Birdsboro	1.94	.....	.....	.....	.....	32.44
Los Angeles	Provo	4.95	27.45	27.95	.....	.....	.....
Los Angeles	Buffalo	15.41	.....	.....	.....	.....	45.91
Mansfield	Cleveland & Toledo	1.94	26.44	26.94	26.94	27.44	.....
Mansfield	Buffalo	3.36	.....	.....	.....	.....	33.86
Philadelphia	Swedeland	.84	26.34	26.84	27.34	27.84	.....
Philadelphia	Birdsboro	1.24	.....	.....	.....	.....	31.74
San Francisco	Provo	4.95	27.45	27.95	.....	.....	.....
San Francisco	Buffalo	15.41	.....	.....	.....	.....	45.91
Seattle	Provo	4.95	27.45	27.95	.....	.....	.....
Seattle	Buffalo	15.41	.....	.....	.....	.....	45.91
St. Louis	Granite City	.50	25.00	25.50	25.50	26.00	.....
St. Louis	Buffalo	7.07	.....	.....	.....	.....	37.57

* Maximum per gross ton, established by OPA February 14, 1945. † Prices do not reflect 3 per cent tax on freight.

(1) Struthers Iron & Steel Co., Struthers, Ohio, may charge 50c. a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable.

Charcoal pig iron base prices for Lyles, Tenn., and Lake Superior furnaces, $33.00 and $34.00, respectively. Newberry Brand of Lake Superior charcoal iron $39.00 per g.t., f.o.b. furnace, by order L 39 to RPS 10, April 11, 1945, retroactive to March 7, 1945. Delivered to Chicago, $42.34. High phosphorus iron sells at Lyles, Tenn., at $28.50.

Basing point prices are subject to switching charges; Silicon differentials (not to exceed 50c. a ton for each 0.25 per cent silicon content in excess of base grade which is 1.75 to 2.25 per cent); Phosphorus differentials, a reduction of 38c. per ton for phosphorus content of 0.70 per cent and over; Manganese differentials, a charge not to exceed 50c. per ton for each 0.50 per cent manganese content in excess of 1.00 per cent. Effective March 3, 1943, $2 per ton extra may be charged for 0.5 to 0.75 per cent nickel content and $1 per ton extra for each additional 0.25 per cent nickel.

Silvery iron and **bessemer ferrosilicon** up to and including 14.00 per cent silicon covered by RPS 10 as amended Feb. 14, 1945. Silvery iron, silicon 6.00 to 6.50 per cent, C/L per G.T., f.o.b. Jackon, Ohio—$30.50; f.o.b. Buffalo—$31.75. Add $1.00 per ton for each additional 0.50% Si. Add 50c. per ton for each 0.50% Mn over 1.00%. Add $1.00 per ton for 0.75% or more P. Bessemer ferrosilicon prices are $1.00 per ton above silvery iron prices of comparable analysis.

METAL POWDERS

Prices are based on current market prices of ingots plus a fixed figure. F.o.b. shipping point, c. per lb., ton lots.

Copper, electrolytic, 150 and 200 mesh	21½ to 23½c.
Copper, reduced, 150 and 200 mesh	20½ to 25½c.
Iron, commercial, 100 and 200 mesh 96 + % Fe	12½ to 15c.
Iron, crushed, 200 mesh and finer, 90 + % Fe, carload lots	4c.
Iron, hydrogen reduced, 300 mesh and finer, 98½ + % Fe, drum lots	63c.
Iron, electrolytic, unannealed, 300 mesh and coarser, 99 + % Fe	30 to 33c.
Iron, electrolytic, annealed minus 100 mesh, 99 + % Fe	42c.
Iron, carbonyl, 300 mesh and finer, 98-99.8 + % Fe	90c.
Aluminum, 100 and 200 mesh	*23 to 27c.
Antimony, 100 mesh	20.6c.
Cadmium, 100 mesh	$1
Chromium, 150 mesh	$1.00
Lead, 100, 200 & 300 mesh	11½ to 12½c.
Manganese, 150 mesh	51c.
Nickel, 150 mesh	51½c.
Solder powder, 100 mesh	8½c. plus metal
Tin, 100 mesh	58¾c.
Tungsten metal powder, 98%-99%, any quantity, per lb.	$2.60
Molybdenum powder, 99%, in 200-lb. kegs, f.o.b. York, Pa., per lb.	$2.60
Under 100 lb.	$3.00

*Freight allowed east of Mississippi.

COKE

Furnace, beehive (f.o.b. oven)	Net Ton
Connellsville, Pa.	$7.50*
Foundry, beehive (f.o.b. oven)	
Fayette Co., W. Va.	8.10
Connellsville, Pa.	9.00
Foundry, By-Product	
Chicago, del'd	13.35
Chicago, f.o.b.	12.60
New England, del'd	14.25
Kearny, N. J., f.o.b.	12.65
Philadelphia, del'd	12.88
Buffalo, del'd	13.00
Portsmouth, Ohio, f.o.b.	11.10
Painesville, Ohio, f.o.b.	11.75
Erie, del'd	12.75
Cleveland, del'd	12.80
Cincinnati, del'd	12.85
St. Louis, del'd	13.85
Birmingham, del'd	10.50

*Hand drawn ovens using trucked coal permitted to charge $8.00 per ton plus transportation charges.

JESSOP Specialty Steels

WAREHOUSE DELIVERIES

HIGH SPEED TOOL STEEL BITS • BARS-SHEETS-PLATES WATER, AIR AND OIL HARDENING TOOL AND DIE STEELS • CHISEL AND SHOCK RESISTING TOOL STEELS CAST-TO-SHAPE RING DIES • AIRCRAFT SHEETS • DRILL ROD • MALTA CARBIDE TIPPED TOOLS • PRECISION GAUGE STOCK • T AND V CAST ALLOY TOOL HOLDER BITS.

Prompt Mill Deliveries Can be Made of the Following:

Jessop Stainless Steel in all analyses for corrosion resistance, heat resistance and high strength.

Stainless-Clad and Composite Steels.

WAREHOUSES:

CHICAGO, ILLINOIS, 1742 Carroll Ave.
CINCINNATI, OHIO, 13 East Second St.
CLEVELAND, OHIO, 1433 Hamilton Ave.
HARTFORD, CONN., 471 Windsor St.
DETROIT, MICHIGAN Woodbridge & Walker St.
MONTREAL, CANADA 1121 Notre Dame St., West
TORONTO, CANADA 530 Front Street, West

ARMY NAVY

JESSOP STEEL CO. FINE JESSOP STEELS EST. 1901 WASHINGTON PA.

JESSOP STEEL COMPANY

Head Office and Mill: WASHINGTON, PENNA.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts:

Base discount less case lots

	Per Cent Off List
½ in. & smaller x 6 in. & shorter	65½
9/16 & ⅝ in. x 6 in. & shorter	63½
¾ to 1 in. x 6 in. & shorter	61
1⅛ in. and larger, all lengths	59
All diameters over 6 in. long	59
Lag, all sizes	62
Plow bolts	65

Nuts, Cold Punched or Hot Pressed

(Hexagon or Square)

¼ in. and smaller	62
9/16 to 1 in. inclusive	59
1⅛ to 1½ in. inclusive	57
1⅝ in. and larger	56

On above bolts and nuts, excepting plow bolts, additional allowance of 10 per cent for full container quantities. There is an additional 5 per cent allowance for carload shipments.

Semi-Fin. Hexagon Nuts	U.S.S.	S.A.E.
Base discount less keg lots		
7/16 in. and smaller	..	64
½ in. and smaller	62	..
⅝ in. through 1 in.	..	60
9/16 in. through 1 in.	59	..
1⅛ in. through 1½ in.	57	58
1⅝ in. and larger	56	..

In full keg lots, 10 per cent additional discount.

Stove Bolts	*Consumer*
Packages, nuts loose	71 and 10
In packages, with nuts attached	71
In bulk	80

On stove bolts freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago, New York on lots of 200 lb. or over.

Large Rivets

(½ in. and larger)

	Base per 100 Lb.
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	$3.75

Small Rivets

(7/16 in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	65 and 5

Cap and Set Screws	*Consumer Per Cent Off List*
Upset full fin, hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in.	64
Upset set screws, cup and oval points	71
Milled studs	46
Flat head cap screws, listed sizes	36
Fillister head cap, listed sizes	51

Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

ROOFING TERNE PLATE

(F.o.b. Pittsburgh, 112 Sheets)

	20x14 in.	20x28 in.
8-lb. coating I.C.	$6.00	$12.00
15-lb. coating I.C.	7.00	14.00
20-lb. coating I.C.	7.50	15.00

ELECTRICAL SHEETS

(Base, f.o.b. Pittsburgh)

	Per Lb.
Field grade	3.30c.
Armature	3.65c.
Electrical	4.15c.
Motor	5.05c.
Dynamo	5.75c.
Transformer 72	6.25c.
Transformer 65	7.25c.
Transformer 58	7.75c.
Transformer 52	8.55c.

F.o.b. Granite City, add 10c. per 100 lb. on field grade to and including dynamo. Pacific ports add 75c. per 100 lb. on all grades.

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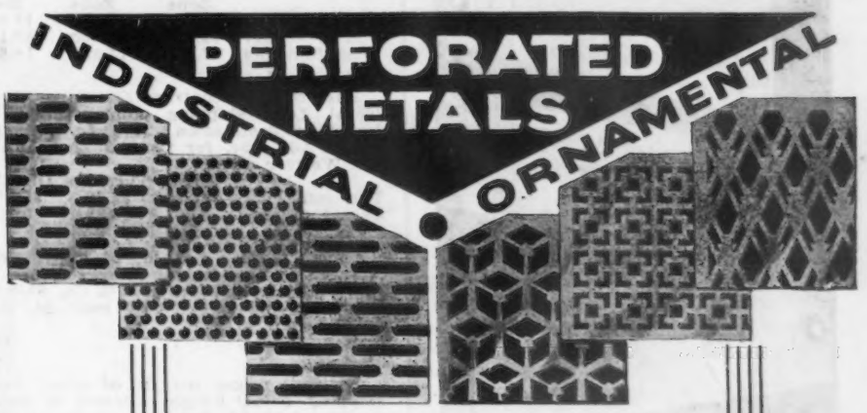

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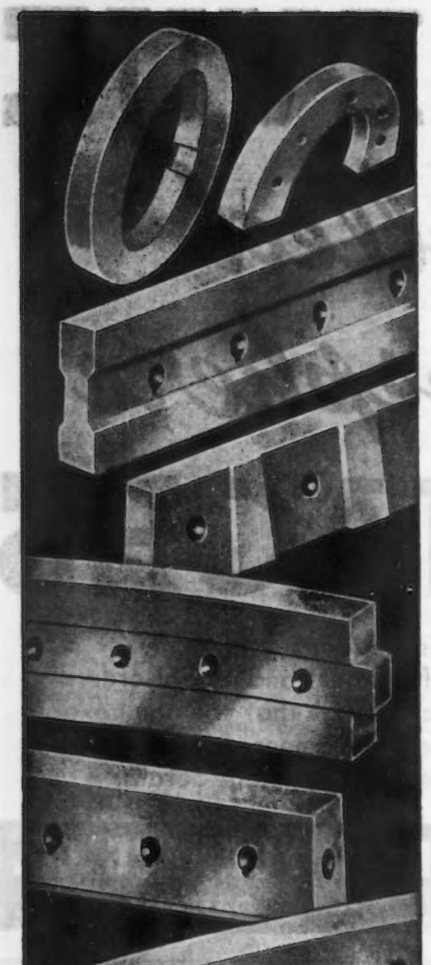

FERROALLOY PRICES

High-Nitrogen Ferrochrome

Low-carbon type: 67-72% Cr, 0.75% N. Add 2c. per lb. to regular low-carbon ferrochrome price schedule. Add 2c. for each additional 0.25% N. High-carbon type: 66-71% Cr, 4-5% C, 0.75% N. Add 5c. per lb. to regular high-carbon ferrochrome price schedule.

Low-Carbon Ferromanganese

Contract prices per lb. of manganese contained, lump size, f.o.b. shipping point, freight allowed to destination, Eastern Zone. Add 0.25c. for spot sales.

	Carloads, Bulk	Ton Lots	Less Ton
0.10% max. C, 1 or 2% max. Si..	23.00c.	23.40c.	23.65c.
0.15% max. C, 1 or 2% max. Si..	22.00c.	22.40c.	22.65c.
0.30% max. C, 1 or 2% max. Si..	21.00c.	21.40c.	21.65c.
0.50% max. C, 1 or 2% max. Si..	20.00c.	20.40c.	20.65c.
0.75% max. C, 7.00% max. Si..	16.00c.	16.40c.	16.65c.

Ferrochrome Briquets

Contract prices per lb. of briquet, f.o.b. shipping point, freight allowed to destination. Approx. 60 per cent contained chromium. Add 0.25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
Carload, bulk..	8.25c.	8.55c.	8.95c.
Ton lots	8.75c.	9.25c.	10.75c.
Less ton lots..	9.00c.	9.50c.	11.00c.

Ferromanganese Briquets

Contract prices per lb. of briquet, f.o.b. shipping point, freight allowed to destination. Approx. 66 per cent contained manganese. Add 0.25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
Carload, bulk..	6.05c.	6.30c.	6.60c.
Ton lots	6.65c.	7.55c.	8.55c.
Less ton lots..	6.80c.	7.80c.	8.80c.

Calcium—Manganese—Silicon

Contract prices per lb. of alloy, lump size, f.o.b. shipping point, freight allowed to destination.

16-20% Ca, 14-18% Mn, 53-59% Si. Add 0.25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
Carloads	15.50c.	16.00c.	18.05c.
Ton lots	16.50c.	17.35c.	19.10c.
Less ton lots.	17.00c.	17.35c.	19.60c.

Calcium Metal

Eastern zone contract prices per lb. of metal, f.o.b. shipping point, freight allowed to destination. Add 5c. for spot sales. Add 0.9c. for Central Zone; 0.49c. for Western Zone.

	Cast	Turnings	Distilled
Ton lots	$1.80	$2.30	$5.00
Less ton lots..	2.30	2.80	5.75

Chromium—Copper

Contract price per lb. of alloy, f.o.b. Niagara Falls, freight allowed east of the Mississippi River. 8-11% Cr, 88-90% Cu, 1.00% max. Fe, 0.50% max. Si. Add 2c. for spot sales.

Shot or ingot ..... 45c.

Ferroboron

Contract prices per lb. of alloy, f.o.b. shipping point, freight allowed to destination. Add 5c. for spot sales. 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C.

	Eastern Zone	Central Zone	Western Zone
Ton lots	$1.20	$1.2075	$1.229
Less ton lots..	1.30	1.3075	1.329

Manganese—Boron

Contract prices per lb. of alloy, f.o.b. shipping point, freight charges allowed. Add 5c. for spot sales.

75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C.

	Eastern Zone	Central Zone	Western Zone
Ton lots	$1.89	$1.903	$1.935
Less ton lots..	2.01	2.023	2.055

Nickel—Boron

Spot and contract prices per lb. of alloy, f.o.b. shipping point, freight allowed to destination.

15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni.

	Eastern Zone	Central Zone	Western Zone
11,200 lb. or more ...	$1.90	$1.9125	$1.9445
Ton lots	2.00	2.09125	2.0445
Less ton lots..	2.10	2.1125	2.1445

Other Ferroalloys

Ferrotungsten, Standard grade lump or ¼X down, packed, f.o.b. plant at Niagara Falls, New York, Washington, Pa. York, Pa., per lb. contained tungsten, 10,000 lb. or more.... $1.90

Ferrovanadium, 35-55%, contract basis, f.o.b. producer's plant, usual freight allowances, per lb. contained Va.

Open hearth	$2.70
Crucible	$2.80
Primos	$2.90

Cobalt, 97% min., keg packed, contract basis, f.o.b. producer's plant, usual freight allowances, per lb. of cobalt metal..... $1.50

Vanadium pentoxide, 88-92% V_2O_5 technical grade, contract basis, any quantity, per lb. contained V_2O_5. Spot sales add 5c. per lb. contained V_2O_5..... $1.10

Silcaz No. 3, contract basis, f.o.b. producer's plant with usual freight allowances, per lb. of alloy. (Pending OPA approval)

Carload lots	25c.
2000 lb. to carload.....	26c.

Silvaz No. 3, contract basis, f.o.b. producer's plant with freight allowances, per lb. of alloy (Pending OPA approval)

Carload lots	58c.
2000 lb. to carload.....	59c.

Grainal, f.o.b. Bridgeville, Pa., freight allowed 50 lb. and over, max. based on rate to St. Louis

No. 1	87.5c.
No. 6	60c.
No. 79	45c.

Bortram, f.o.b. Niagara Falls

Ton lots, per lb.....	45c.
Less ton lots, per lb.....	50c.

Ferrocolumbium, 50-60%, contract basis, f.o.b. plant with freight allowances, per lb. contained Cb.

2000 lb. lots	$2.25
Under 2000 lb. lots.....	$2.30

Ferrotitanium, 40-45%, 0.10%C. max. f.o.b. Niagara Falls, N. Y., ton lots, per lb. contained Ti.. $1.25
Less ton lots..... $1.35

Ferrotitanium, 20-25%, 0.10%C. max., ton lots, per lb. contained titanium $1.35
Less ton lots..... $1.40

High-carbon ferrotitanium, 15%-20%, 6-8% carbon, contract basis, f.o.b. Niagara Falls, N. Y. freight allowed East of Mississippi River, north of Baltimore and St. Louis, per carload..... $142.50

Ferrophosphorus, 18% electric or blast furnaces, f.o.b. Anniston, Ala., carlots, with $3 unitage freight equalled with Rockdale, Tenn., per gross ton..... 58.50

Ferrophosphorus, electrolytic 23-26%, carlots, f.o.b. Monsanto (Sigio), Tenn., $3 unitage freight equalized with Nashville, per gross ton $75.00

Ferromolybdenum, 55-75%, f.o.b. Langeloth, Washington, Pa., any quantity, per lb. contained Mo. 95c.

Calcium molybdate, 40-45%, f.o.b. Langeloth and Washington, Pa., any quantity, per lb. contained Mo. ..... 80c.

Molybdenum oxide briquets, 48-52% Mo. f.ob. Langeloth, Pa. per lb. contained Mo..... 80c.

Molybdenum oxide, in cans, f.o.b Langeloth and Washington, Pa. per lb. contained Mo..... 80c.

Zirconium, 35-40%, contract basis, f.o.b. producer's plant with freight allowances, per lb. of alloy. Add ¼c. for spot sales

Carload lots	14c.

Zirconium, 12-15%, contract basis, lump f.o.b. plant usual freight allowances, per lb. of alloy

Carload, bulk	4.6c.

Alsifer (approx. 20% Al, 40% Si and 40% Fe), contract basis, f.o.b. Niagara Falls, carload, bulk ..... 5.75c.
Ton lots ..... 7.25c.

Simanal (approx. 20% Si, 20% Mn, 20% Al), contract basis, f.o.b. Philo, Ohio, with freight not to exceed St. Louis rate allowed, per lb.

Car lots	8.00c.
Ton lots	8.75c.
Less ton lots	9.25c.

PRICES

Ferromanganese

78-82% Mn, maximum contract base price per gross ton, lump size, f.o.b. car at Baltimore, Philadelphia, New York, Birmingham, Rockdale, Rockwood, Tenn.

Carload lots (bulk)	$135.00
Carload lots (packed)	141.00
Less ton lots (packed)	148.50

$1.70 for each 1% above 82% Mn; penalty, $1.70 for each 1% below 78%.

Manganese Metal

Contract basis, lump size, per lb. of metal, f.o.b. shipping point with freight allowed. Spot sales add 2c. per lb.

96-98% Mn, .2% max. C, 1% max. Si, 2% max. Fe.

Carload, bulk	36c.
L.c.l. lots	38c.

95-97% Mn, .2% max. C, 1.5% max. Si, 2% max. Fe.

Carload, bulk	34c.
L.c.l. lots	35c.

Spiegeleisen

Maximum base, contract prices, per gross ton, lump, f.o.b. Palmerton, Pa.

	16-19% Mn 3% max. Si	19-21% Mn 3% max. Si
Carloads	$35.00	$36.00
Less ton	47.50	48.50

Electric Ferrosilicon

OPA maximum base price cents per lb. contained Si, lump size in carloads, f.o.b. shipping point with freight allowed.

	Eastern Zone	Central Zone	Western Zone
50% Si	6.65c.	7.10c.	7.25c.
75% Si	8.05c.	8.20c.	8.75c.
80-90% Si.	8.90c.	9.05c.	9.55c.
90-95% Si.	11.05c.	11.20c.	11.65c.

Spot sales add: 45c. per lb. for 50% Si, .3c. per lb. for 75% Si, .25c. per lb. for 80-90% and 90-95% Si.

Silvery Iron

Silvery Iron, Silicon 14.01 to 14.50 per cent, $45.50 per G. T. f.o.b. Jackson, Ohio. Add $1.00 per ton for each additional 0.50% Si up to and including 18%. Add $1.00 per ton for low impurities, not to exceed: P—0.05%, S—0.04%, C—1.00%. Covered by MPR 405.

Silicon Metal

OPA maximum base price per lb. of contained Si, lump size, f.o.b. shipping point with freight allowed to destination, for l.c.l. above 2000 lb., packed. Add .25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
96% Si, 2% Fe	13.10c.	13.55c.	16.50c.
97% Si, 1% Fe	13.45c.	13.90c.	16.80c.

Ferrosilicon Briquets

OPA maximum base price per lb. of briquet, bulk, f.o.b. shipping point with freight allowed to destination. Approximately 40% Si. Add .25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
Carload, bulk	3.35c.	3.50c.	3.65c.
2000 lb-carload	3.8c.	4.2c.	4.25c.

Silicomanganese

Contract basis lump size, per lb. of metal, f.o.b. shipping point with freight allowed. Add .25c. for spot sales. 65-70% Mn, 17-20% Si, 1.5% max. C.

Carload, bulk	6.05c.
2000 lb. to carload	6.70c.
Under 2000 lb.	6.90c.
Briquets, contract, basis carlots, bulk freight allowed, per lb.	5.80c.
2000 lb. to carload	6.30c.
Less ton lots	6.55c.

Ferrochrome

(65-72% Cr. 2% max. Si)

OPA maximum base contract prices per lb. of contained Cr, lump size in carload lots, f.o.b. shipping point, freight allowed to destination. Add .25c. per lb. contained Cr for spot sales.

	Eastern Zone	Central Zone	Western Zone
0.06% C	23.00c.	23.40c.	24.00c.
0.10% C	22.50c.	22.90c.	23.50c.
0.15% C	22.00c.	22.40c.	23.00c.
0.20% C	21.50c.	21.90c.	22.50c.
0.50% C	21.00c.	21.40c.	22.00c.
1.00% C	20.50c.	20.90c.	21.50c.
2.00% C	19.50c.	19.90c.	21.00c.
66-71% Cr, 4-10%	13.00c.	13.40c.	14.00c.
62-66% Cr, 5-7% C	13.50c.	13.90c	14.50c.

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The Type LAP, burning No. 1 to No. 6 fuel oils and using low air pressure for atomization, has a versatility that meets the exacting conditions of the metal working industries. Is of simple yet rugged construction . . . has wide operating range . . . is free from clogging. Available in six sizes with capacities up to 100 gals. per hour . . . manual or automatic controls. For more details send for Bulletin 65.

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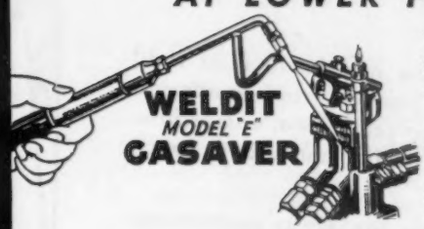

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When the Weldit Gasaver has been installed, you simply hang idle torch on the handy lever rod. Weight of torch pulls rod down, thus automatically shutting off supply lines. Relight instantly by passing torch over Gasaver pilot light. No bother. . . . No time lost. . . . *No readjusting required.* . . . Price $10.00 at Detroit. Order today.

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